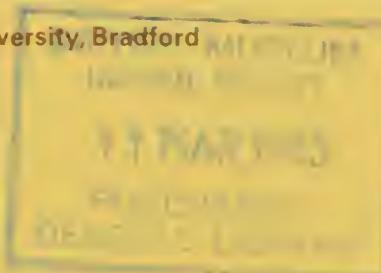


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Edited by

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WILDFOWL OF AN INDUSTRIALIZED ESTUARY — A REVIEW OF DUCK NUMBERS AT TEESMOUTH

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1. INTRODUCTION

The World Conservation Strategy calls for conservation with development, two concepts which are often thought to be diametrically opposed. The aim of this paper is to show that even a highly industrialized region like Teesmouth can support an important wildfowl population. In fact, based on published data, Teesmouth probably has more wildfowl today than it did a century ago, even though the intertidal mudflats and marshes have decreased by over 90 per cent. The Tees estuary is in county Cleveland on the north-east coast of England about 8 km

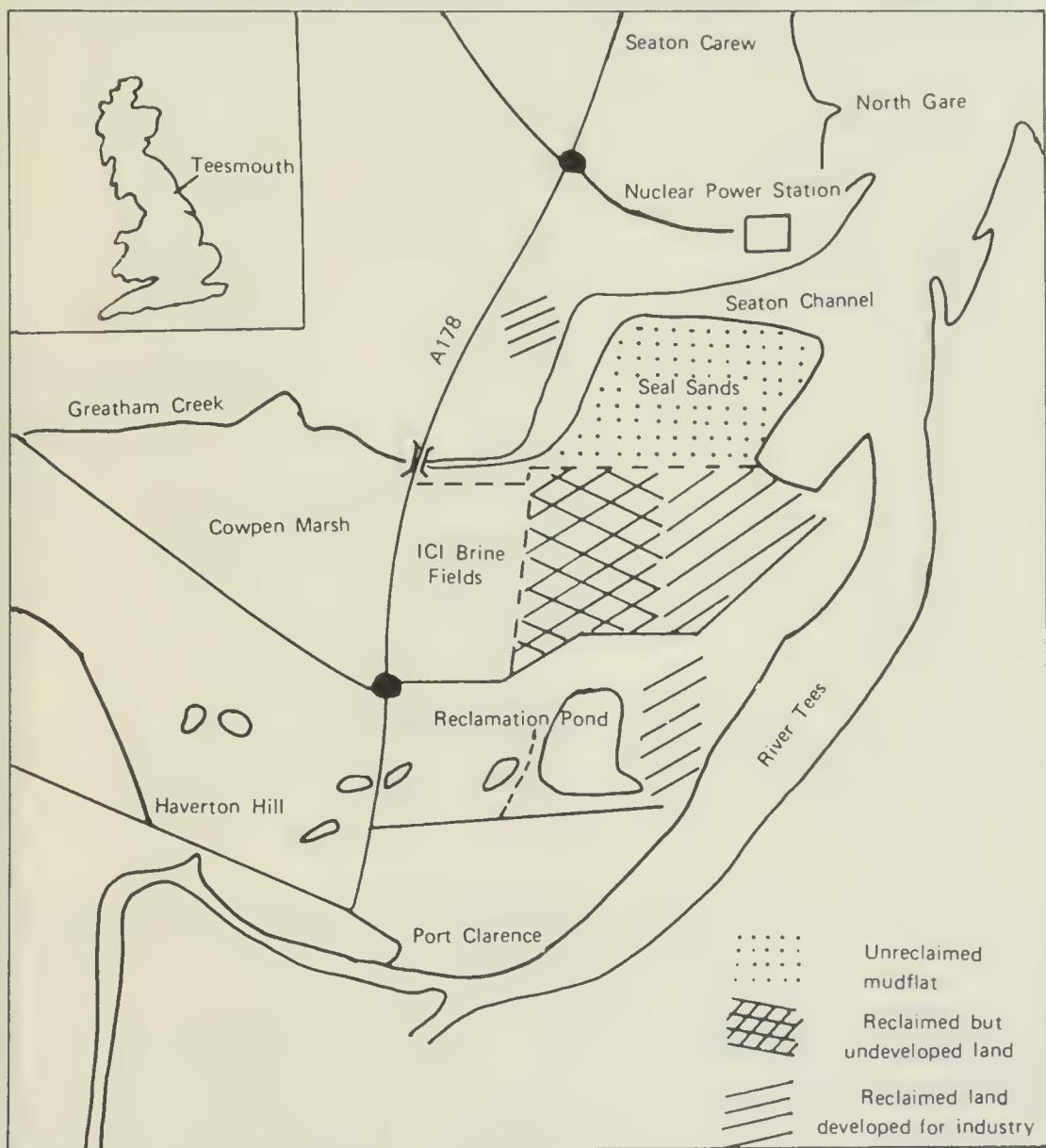


FIGURE 1
Map of Teesmouth, Cleveland, showing locations mentioned in text.

north-east of Middlesbrough (see Figure 1). In this paper Teesmouth is taken to include the intertidal mudflats, marshes and brackish pools lying between Port Clarence and Seaton Carew on the northern bank of the river. The mudflats, known as Seal Sands, are the only intertidal mudflats remaining on the north-east coast between the Humber in Yorkshire, 140 km to the south and Fenham Flats, 130 km to the north in Northumberland. Most of the wildfowl visiting Teesmouth spend some time on Seal Sands and it is practically the sole feeding ground for Shelducks. (Scientific names are given in Table 1.) The equivalent mudflats to the south of the Tees, known as Bran Sands, are, due to pollution and development, not as attractive to birds, although there have been some recent improvements.

Separated from the mudflats by slag revetment walls are a number of areas of saltmarsh which are used as feeding areas by such ducks as Mallard, Teal and Wigeon. The largest marsh area,

TABLE 1
Wildfowl Species Occurring at Teesmouth

Species		Status
Mute Swan	<i>Cygnus olor</i>	3
Bewick's Swan	<i>C. columbianus</i>	4
Whooper Swan	<i>C. cygnus</i>	4
Bean Goose	<i>Anser fabalis</i>	5
Pink-footed Goose	<i>A. brachyrhynchus</i>	4
White-fronted Goose	<i>A. abifrons</i>	5
Greylag Goose	<i>A. anser</i>	4
Canada Goose	<i>Branta canadensis</i>	4
Barnacle Goose	<i>B. leucopsis</i>	5
Brent Goose	<i>B. bernicla</i>	4
Shelduck	<i>Tadorna tadorna</i>	1
Wigeon	<i>Anas penelope</i>	1
American Wigeon	<i>A. americana</i>	6
Gadwall	<i>A. strepera</i>	5
Teal	<i>A. crecca</i>	1
Mallard	<i>A. platyrhynchos</i>	1
Pintail	<i>A. acuta</i>	3
Garganey	<i>A. querquedula</i>	4
Shoveler	<i>A. clypeata</i>	3
Red crested Pochard	<i>Netta rufina</i>	6
Pochard	<i>Aythya ferina</i>	2
Tufted Duck	<i>A. fuligula</i>	4
Scaup	<i>A. marila</i>	4
Eider*	<i>Somateria mollissima</i>	4
Long-tailed Duck*	<i>Clangula hyemalis</i>	4
Common Scoter*	<i>Melanitta nigra</i>	4
Velvet Scoter*	<i>M. fusca</i>	4
Goldeneye	<i>Bucephala clangula</i>	2
Smew	<i>Mergus albellus</i>	5
Red-breasted Merganser	<i>Mergus serrator</i>	4
Goosander	<i>M. merganser</i>	5

1=Common, 500+ regularly present every winter.

2=Quite common, 100+ regularly present every winter, numbers increasing.

3=Regular in small numbers, up to 100 birds.

4=Regular visitor, but not always present throughout the season.

5=Uncommon or rare visitor.

6=Very rare visitor.

* Usually found at the mouth of the river near the North and South Gares.

known as Cowpen Marsh, is currently leased as a reserve to the Cleveland Nature Conservation Trust by its owners, ICI PLC. Cowpen holds a small number of breeding ducks, mainly Mallard, but in the past the breeding population has included Shoveler and Pintail (Stead, 1964).

In recent years, pools with considerable marginal vegetation have formed on the reclaimed but undeveloped portion of Seal Sands. This area is regularly frequented by surface feeding ducks and is often used as a roost by Shelducks.

2. RECLAMATION AND INDUSTRY

For at least 700 years the river Tees has been used for commerce and trading and with the opening of the Stockton to Darlington railway in 1825, the importance of the Tees to coal shipping grew rapidly. Before 1852 there had been few changes made to the estuary, but in 1853 the first modifications were under way with the start of dredging operations in the main channel.

Towards the end of the 19th century there were about 2400 ha. of intertidal mudflats at Teesmouth, but in the 1890s, soon after the completion of the breakwater known as North Gare, which guards the northern entrance of the river, reclamation of the mudflats within the estuary began. By 1900 some 1012 ha. of mudflats had been reclaimed and reclamation continued in various phases until the mid 1970s. By 1952 about 60 per cent of the original flats had been lost and this reclamation accelerated in the 22 years between 1952 and 1974 when no less than 75 per cent of the remaining mudflats was taken (see Figure 2).

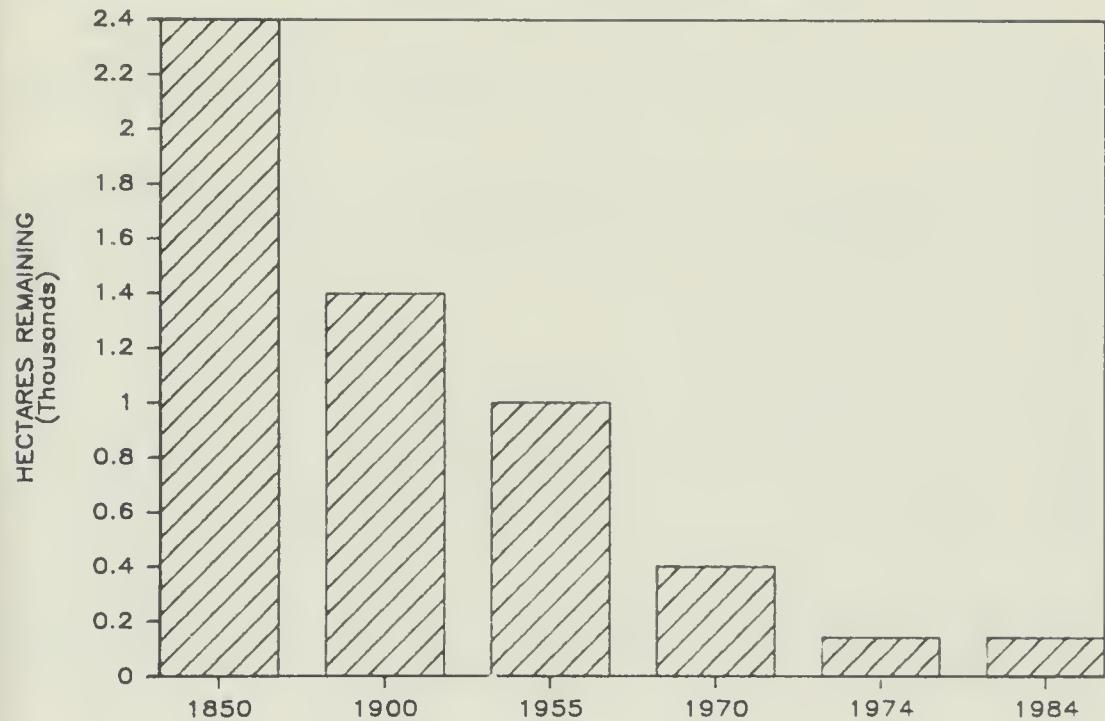


FIGURE 2

Reclamation for industrial development of intertidal mudflats at Teesmouth since the mid nineteenth century. Today less than 10 per cent of the original flats remain.

Since 1974 there has been little further reclamation and about 142 ha. of mud remain to the north of Greatham Creek (about 6 per cent of the area occupied by mudflats in the mid nineteenth century) (Stead, 1964; Cooper, 1966). This remaining area is a Site of Special Scientific Interest (SSSI) and has been re-registered as such under the Wildlife and Countryside Act 1981 but, as will be discussed later, its future is still not totally secure.

With reclamation came industry and for many years the banks of the river Tees have been used for heavy industrial developments. Amongst the first to arrive in the late 1890s were the

iron and steel companies, who built blast furnaces on the southern side of the river, using the furnace slag to construct revetment walls and reclaim the mudflats. Today the British Steel Corporation still operates plants in the same area and by 1974 had reclaimed much of the remaining Bran Sands to build a new iron ore terminal.

Shipbuilding followed the steel industry, but this has since declined, although there was a brief revival of the Graythorpe shipyard in 1972 to construct North Sea oil rigs. Today the major industries around the Tees estuary are chemicals and oil.

Between 1964 and 1966 PIP's oil refinery and ICI's aromatics plant were built, but on land reclaimed some years previously, so they had little actual impact on bird habitat.

The construction of a new road across Seal Sands was completed in 1968 and between then and 1972, 182 ha. of the southern part of Seal Sands were enclosed and partially reclaimed. This reclamation was almost completed (except for 69 ha.) in 1973-74 by depositing dredgings from the channel deepening operations at the river mouth. The reclaimed land was used for sites for the Rhom & Haas and Monsanto chemical plants and for tank farms for the Seal Sands Storage and the Tees Storage Companies. By 1975 the last part of the southern portion of Seal Sands had been reclaimed and major construction work was under way on the chemical and refinery sites. Gradually, however, as the various developments were completed, the estuary, though heavily industrialized, became less disturbed.

3. WILDFOWL NUMBERS

The Tees marshes have long been renowned for their birdlife, and, as Table 1 shows, no less than 31 species of wildfowl have been recorded, with 23 of them being of more or less regular occurrence.

During the nineteenth century Teesmouth's ducks had some commercial importance. Professional wildfowlers from Lincolnshire used to visit the marshes during the winter season and a duck decoy was operated on Coatham Marsh to the south of the estuary. This decoy was evidently very successful and on at least one occasion nearly 500 ducks were trapped in a single catch (Nelson, 1907). It has been assumed that since vast areas of marsh and mudflat have now been reclaimed, wildfowl populations in the past were much higher than they are today (Atkinson-Willes, 1963). However, none of the published avifaunas of the region (Nelson, 1907; Temperly, 1951; Chislett, 1952; Stead, 1964, 1969; Blick, 1978) gives very much numerical information on wildfowl concentrations for the nineteenth and early twentieth centuries. On the contrary, the little evidence available suggests that wildfowl are more numerous today than they were a century ago. Certainly since systematic wildfowl counts began in the late 1940s there has been a dramatic increase in duck populations at Teesmouth in spite of the loss of over 800 hectares of mudflat.

Using monthly counts (Stewart, 1968-1973, 1974; Bell, 1975-1982; plus personal observation) for the main duck species frequenting Teesmouth the number of 'duck days' for 18 winter seasons (September-March) between 1963 and 1980 have been calculated. The method used was that of Harrison (in Williams, 1980), where duck days are expressed as:

$$\text{duck days} = \frac{(\text{count no. 1} + \text{count no. 2})}{2} \times \text{number of days between.}$$

The results are shown in Figures 3-5.

For the winter seasons prior to 1963 detailed monthly figures are not readily available, but an average value for duck days for nine seasons up to 1963 has been established from the 'regular count' data given by Atkinson-Willes (1963). However, the 'regular counts' as defined by Atkinson-Willes are based on the 'average largest counts', so duck days calculated from these figures will be over-estimates.

Table 2 compares these rough estimates with the average number of duck days for the five seasons 1976/77-1980/81 and clearly shows that greater numbers of wildfowl have used the Tees estuary in recent years.

THOUSANDS OF DUCK DAYS

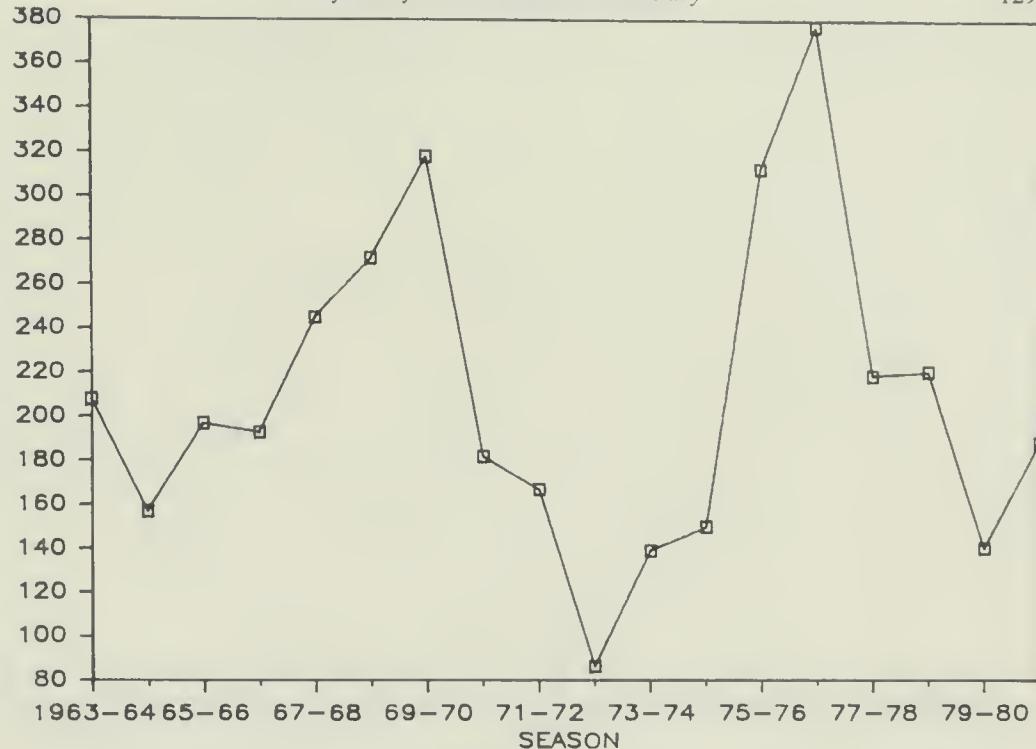


FIGURE 3

Average Shelduck days at Teesmouth for 18 winter seasons. Based on monthly counts from September through to March for each season.

THOUSANDS OF DUCK DAYS

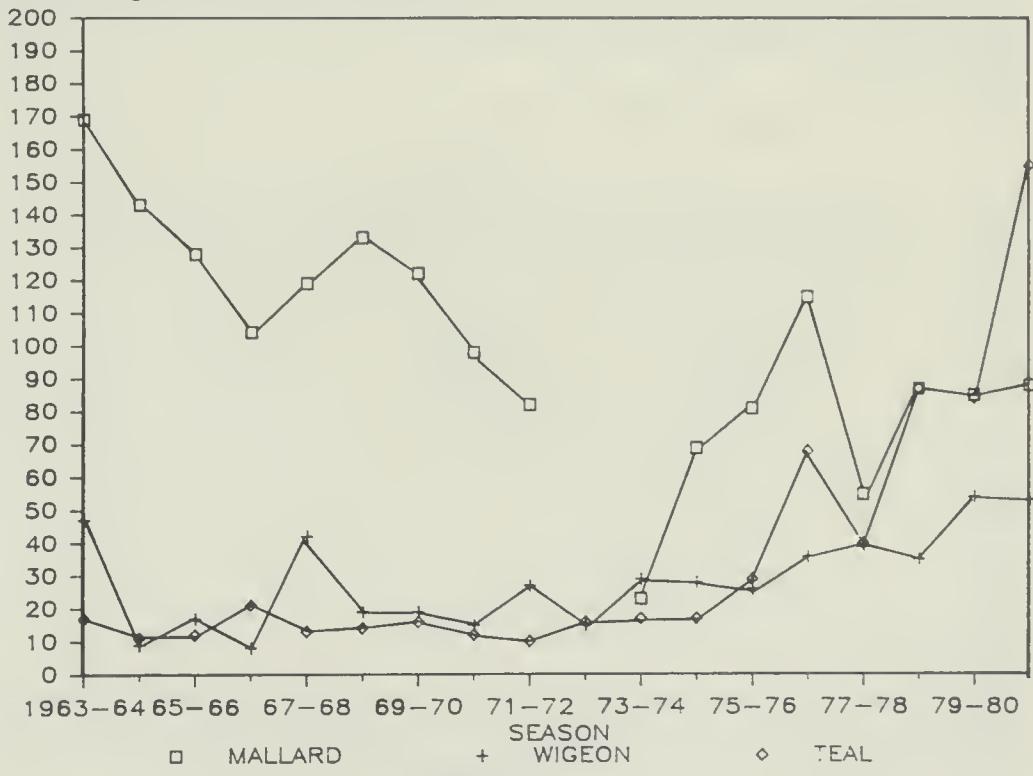


FIGURE 4

Average duck days at Teesmouth for Mallard, Teal and Wigeon for 18 winter seasons. Based on monthly counts from September through to March for each season. Breaks in lines mean insufficient data.

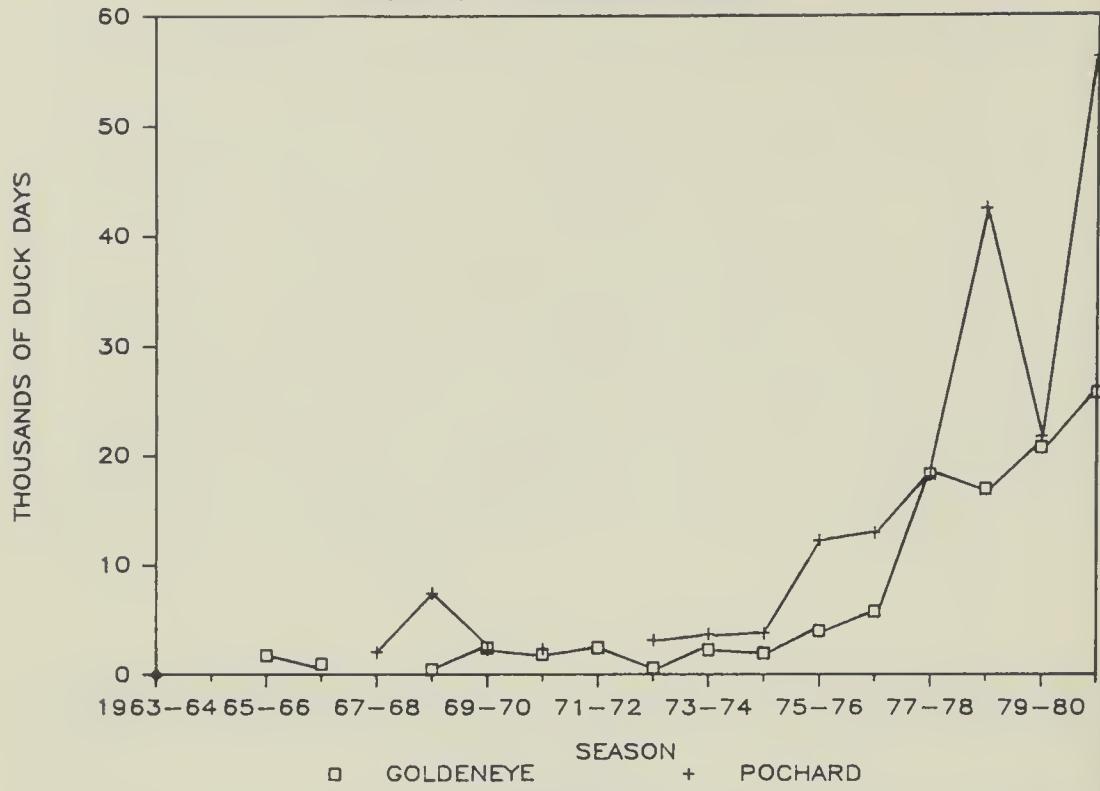


FIGURE 5
Average duck days at Teesmouth for Goldeneye and Pochard for 18 winter seasons. Based on monthly counts from September through to March for each season. Breaks in lines mean insufficient data.

TABLE 2
Increase in Duck Days of Surface Feeding Ducks Wintering at Teesmouth

Species	Thousands duck days		ratio
	Average 9 seasons pre-1963	Average 5 seasons 1976/77-1980/81	
Shelduck	50	228	1 : 4.6
Mallard	49	86	1 : 1.8
Wigeon	19	43	1 : 2.3
Teal	8	87	1 : 10.9

3.1 SHELDUCK

Shelduck are the most numerous of the wintering wildfowl species at Teesmouth, accounting for 41 per cent of the total ducks present in recent years (Figure 6). However, the Shelduck population wintering at Teesmouth is not static; there is a constant movement of birds in and out of the estuary (Evans, 1978/79). During the mid-winter period of December through January, some thousands of birds are regularly present, as will be seen from Figure 7. From their lowest ebb in August, Shelduck numbers at Teesmouth rapidly build up during September-December to peak during January. Numbers then decrease steadily to about 100 birds in May. The

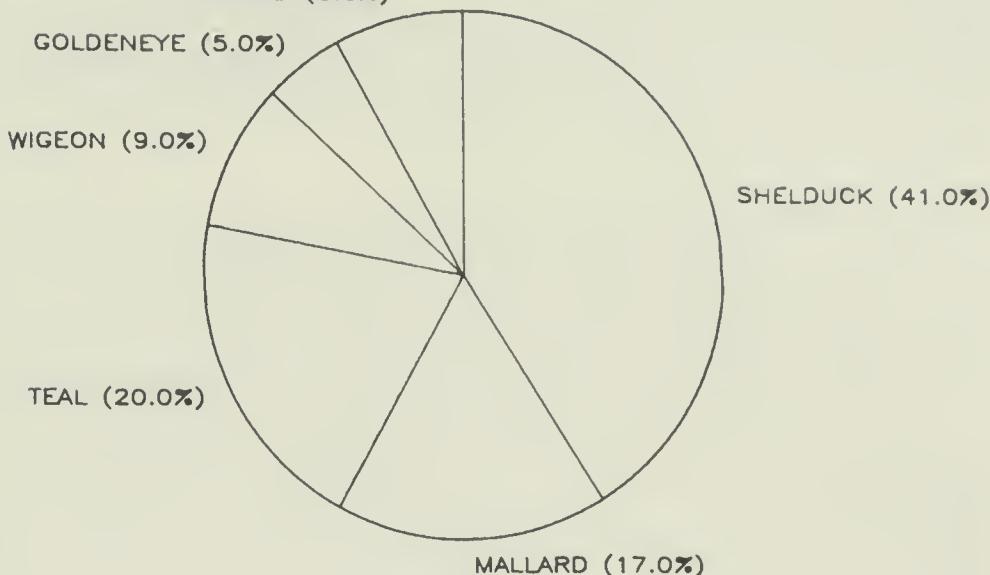


FIGURE 6

Relative abundance of the main species of duck present at Teesmouth during the mid-winter — November to February period. Based on average duck days from 1963–1964 to 1980–1981.

post-breeding increase in numbers during late June and July is probably due to birds passing through the estuary during moult migration.

In the past, Shelducks were very much less numerous at Teesmouth. Towards the end of the nineteenth century and in the earlier years of the twentieth century gatherings of 100 or more birds were considered large flocks and a group of 300 in 1882 was regarded as an exceptionally high concentration (Templer, 1951).

Although winter Shelduck populations at Teesmouth appear to be rather cyclic, showing distinct peaks and troughs as illustrated in Figure 3, on average there has been about a four-fold increase in their numbers since the early 1960s.

The highest Shelduck count ever recorded at Teesmouth was of 4443 birds on 16 January 1970 (Blick, 1978). At the time, this was the highest number of Shelducks ever recorded at a single site in Britain. Since then peak numbers of Shelducks have been lower, although populations based on Shelduck days continued to increase to an all-time high in 1976/77. After reaching a trough in the 1979/80 season the present trend is again upwards and, although January counts for the past six seasons have been below the British trend (Figure 8), Teesmouth still maintains its importance as a wintering area for this species (Table 3).

It is generally accepted that if a locality regularly supports 1 per cent or more of a geographical population of a species, then that locality should be regarded as a site of international importance (Smart, 1976). On this basis, therefore, Teesmouth has been of international importance for Shelducks for over 20 years and, in spite of the enormous reclamation and industrialization in recent years, it still remains so today.

The couple of hundred or so birds which spend the late spring and early summer in the estuary are in the main non-breeding birds, since few pairs nest at Teesmouth. However, as shown in Table 4, there has been some increase in nesting pairs and young hatched in recent years. Thus between 1973 and 1980 an average of 9.6 pairs hatched 79 young per year compared with an average of 4.5 pairs hatching 35.6 young between 1961 and 1971.

The breeding population of Shelduck at Teesmouth is relatively small, but is interesting as probably all the nesting pairs utilize crevices in the slag walls as nesting sites and have done so since as early as 1883 (Lofthouse, 1887). It is almost certain that without this man-made habitat of rough-slag walls few, if any, Shelducks would nest, their traditional nesting sites in the sand-dunes of Hartlepool and Seaton Carew having either disappeared under development or being too disturbed to allow successful breeding.

3.2 OTHER SURFACE FEEDING DUCKS

The other common surface feeding ducks at Teesmouth, Mallard, Wigeon and Teal, have also shown increases in recent years over their pre-1963 populations (Figure 4, Table 2).

The population trend in Mallard at Teesmouth over the past six seasons has closely followed the British average (Figure 9), although locally the birds have been relatively more numerous than in the base year of 1977.

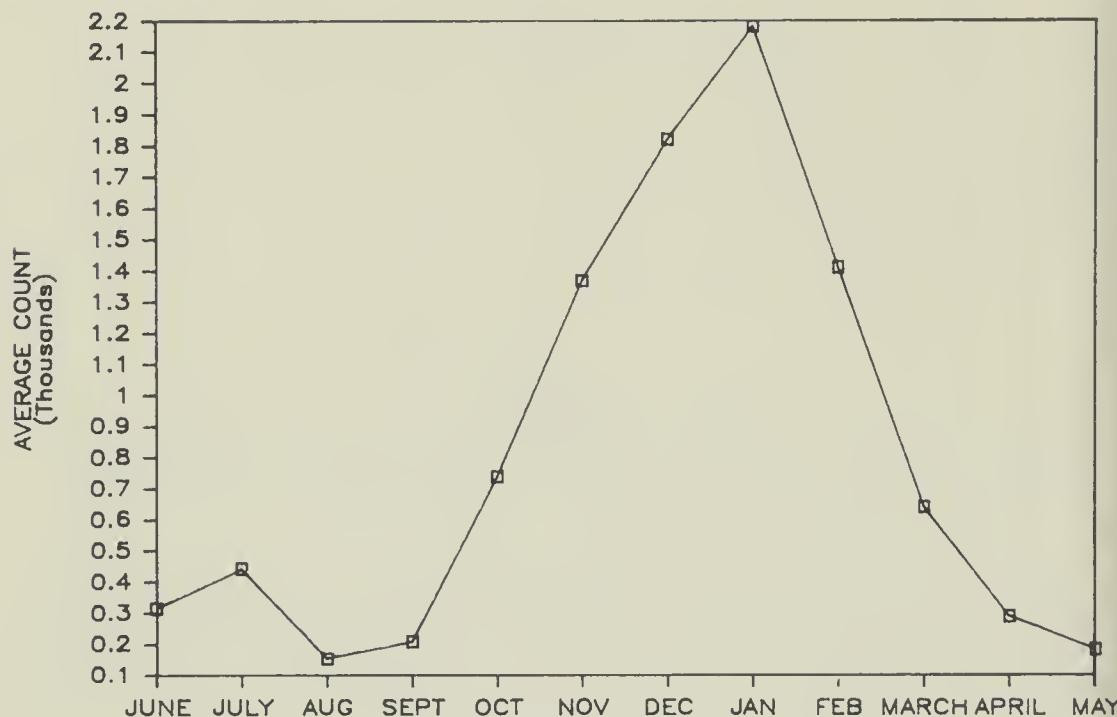


FIGURE 7

Average monthly counts of Shelduck at Teesmouth based on 20 years from 1962 to 1981.

Mallard reached a peak in 1968/69 and then declined rapidly, with some slight recovery in 1970/71 to a low in 1972/73. By the 1979/80 winter, numbers had again risen to about three times the average level of 20–30 years ago.

Teal have shown the greatest increase of all surface feeding ducks at Teesmouth in recent years. For ten seasons between 1963/64 and 1972/73 Teal days at the estuary were fairly steady, showing only relatively small fluctuations. Since then, however, there has been a large increase in the winter population (Figure 4). Numbers recovered rapidly from the slight decrease which affected most ducks at Teesmouth in the 1977/78 winter. For the past six seasons Teal population trends at Teesmouth have been well above the British average (Figure 10).

Wigeon have never been very numerous at Teesmouth, the highest recorded flock being 800 in October 1963 (Stead, 1969). There has, however, been a fairly steady increase in wintering birds since 1972/73 and they did not seem to be particularly affected in 1977/78, when the population of other duck species dropped.

Shoveler and Pintail have always been relatively uncommon ducks at Teesmouth and cannot be considered to constitute a regular wintering population. Figure 11 shows the peak numbers of Shoveler and Pintail at Teesmouth for 19 seasons. However, it will be seen that average peak Shoveler numbers between 1974/75 and 1981/82 have shown a three-fold increase over the average of previous years. Pintail is the only duck species to have decreased in recent years at

Teesmouth. The average peak for the ten winter seasons from 1972/73-1981/82 was 16 birds, whereas the average for the nine previous seasons was 43 birds, the greatest recorded count being 60 in March 1971. The peak of 65 reported by Atkinson-Willes (1973) is incorrect, due to a clerical error on the census card (Stead, 1969).

3.3 DIVING DUCKS

In the past, diving ducks have never been particularly numerous at Teesmouth, their appearance in the estuary usually being associated with cold weather and the freezing over of inland waters. However, since the mid 1970s the numbers of wintering Pochard and Goldeneye have been increasing rapidly. For the twelve seasons before the 1975-1976 winter, Goldeneye and Pochard days at Teesmouth were generally below 4000 (although Pochard days reached nearly 8000 in the 1968-1969 season), but since then Goldeneye days have never fallen below 17,000 and Pochard days never below 22,000 (see Figure 5).

Most of the ducks congregate to feed at the mouth of Greatham Creek where, in recent years, the increases in mid-winter (January) concentrations of both species have greatly exceeded the British average (see Table 5, Figures 12 and 13).

As will be seen, the wintering Goldeneye population at Teesmouth is rapidly approaching the qualifying level for a site of national importance (i.e. 150 for the latest five seasons (Salmon, 1982) and, if the present trend continues, Pochard populations could also reach national significance i.e. 500).

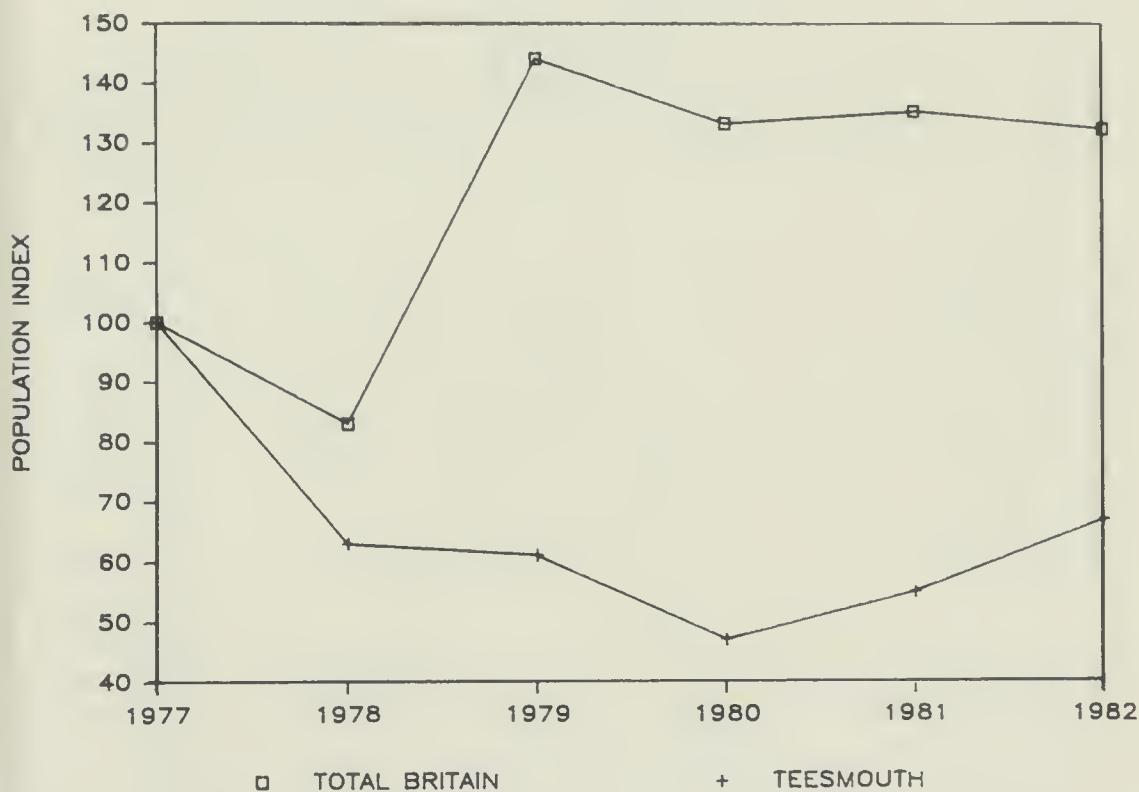


FIGURE 8

Comparison of the Teesmouth Population Index (PI) for Shelduck with the British PI. The Teesmouth index is based on the wildfowl count for January each year and the National index on the corresponding total UK count submitted to the National Wildfowl Census collated by the Wildfowl Trust. In each case 1977 is taken as the base year.

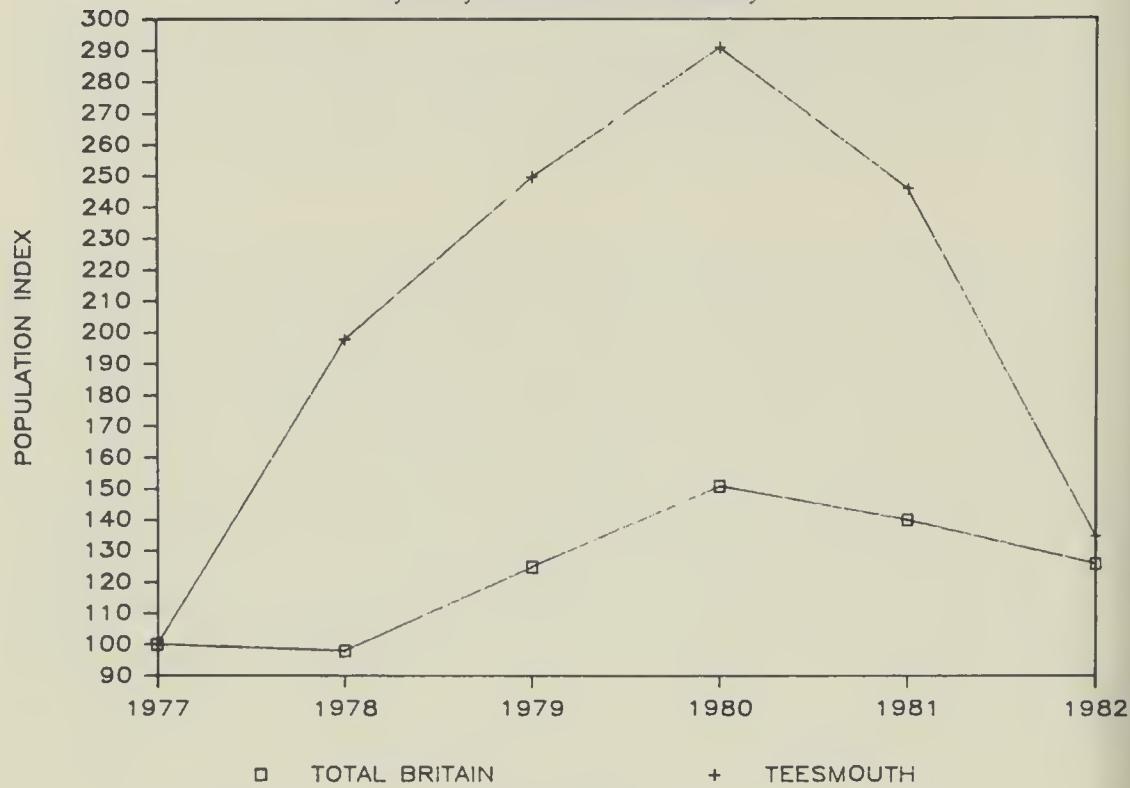


FIGURE 9
Comparison of Mallard Population Indices (see legend to Figure 8).

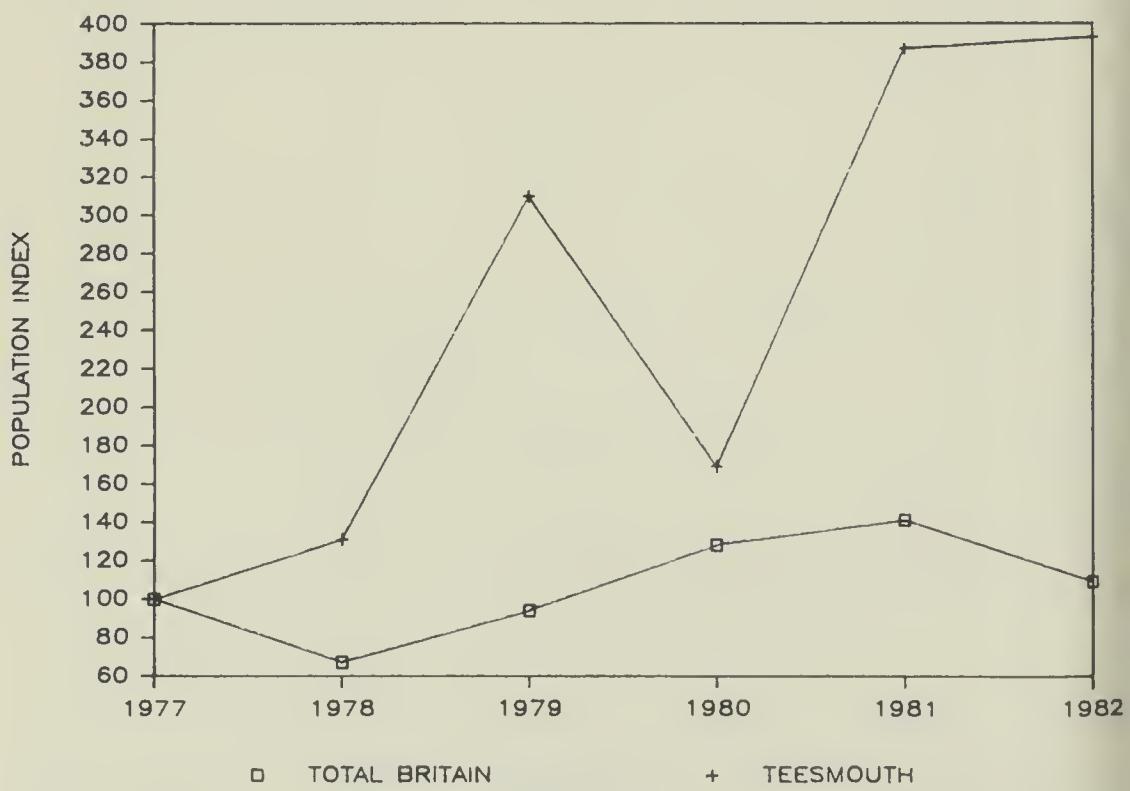


FIGURE 10
Comparison of Teal Population Indices (see legend to Figure 8).

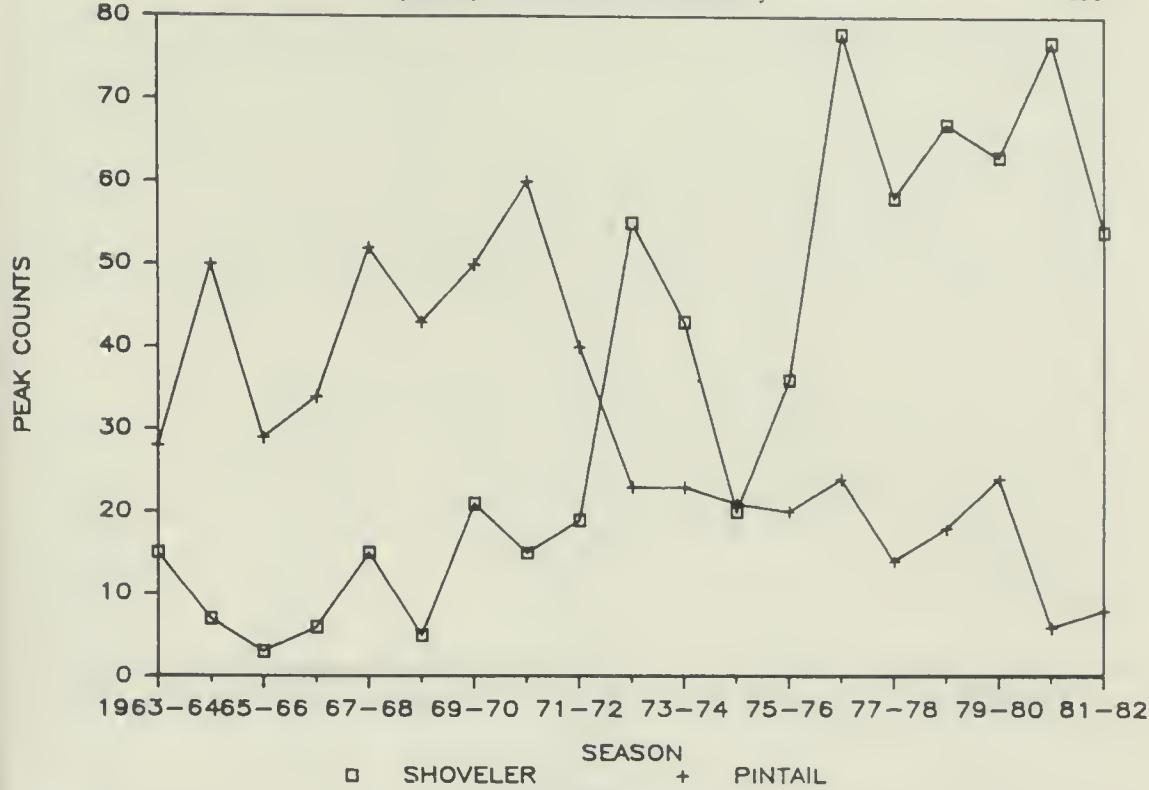


FIGURE 11

Peak Shoveler and Pintail counts at Teesmouth recorded between September and March for 18 seasons from 1963-1964 to 1980-1981.

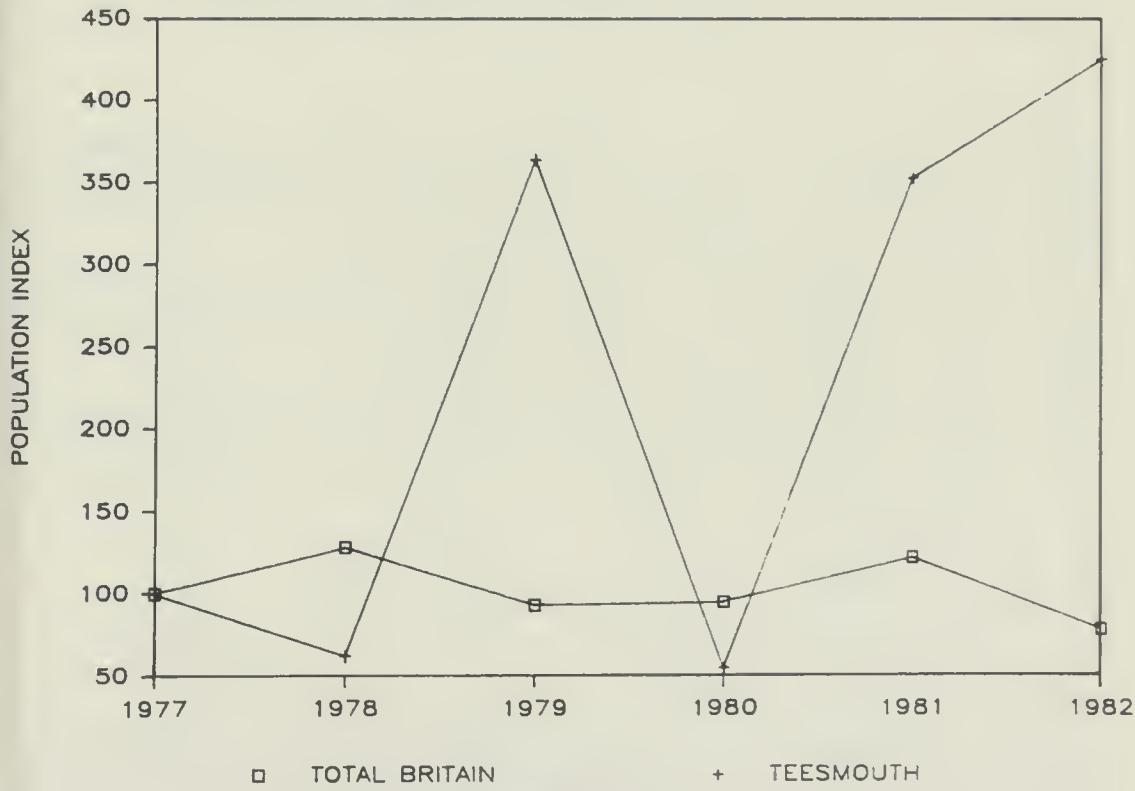


FIGURE 12

Comparison of Pochard Population Indices (see legend to Figure 8).

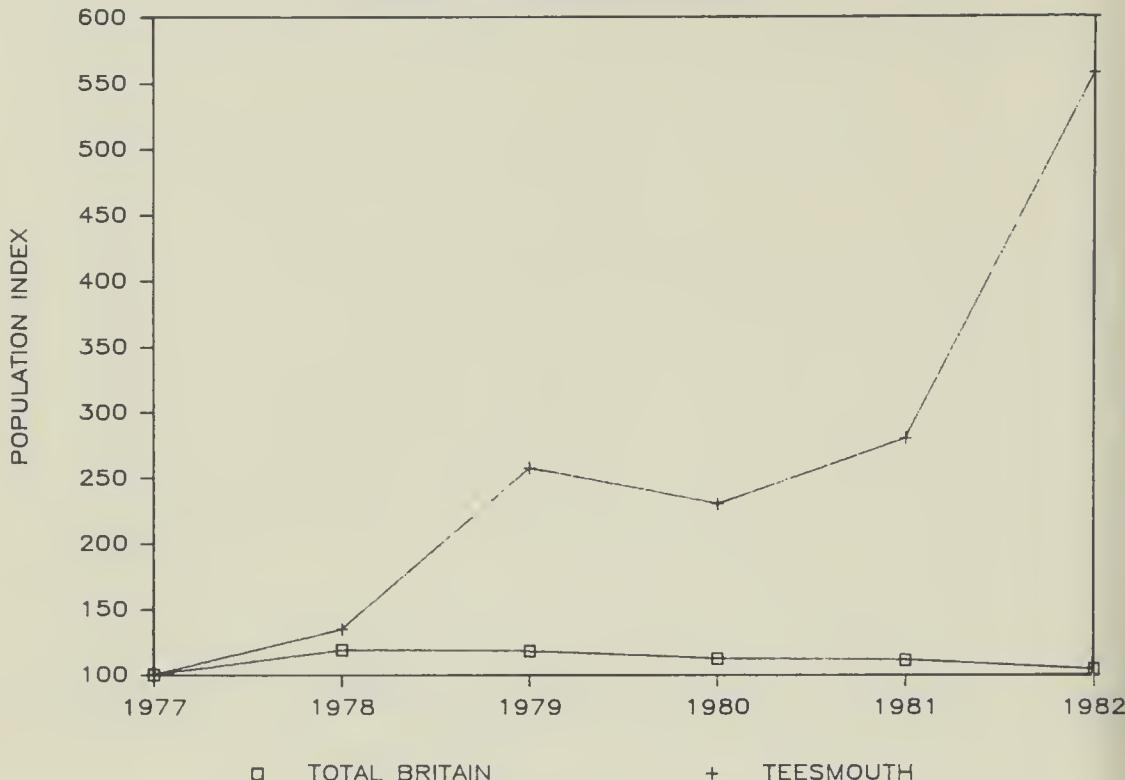


FIGURE 13
Comparison of Goldeneye Population Indices (see legend to Figure 8).

4. DISCUSSION

With a loss of about 75 per cent of tidal mudflats since 1960 and with the tremendous increase in industrial development at Teesmouth, it would be reasonable to assume that the number of wintering wildfowl would have decreased. However, wildfowl counts show that, on the whole, ducks are much more numerous now than they were 20–30 years ago.

The increase in wintering wildfowl numbers is real and is not just a function of more experienced observers visiting the area and recording birds that hitherto went unnoticed. Systematic wildfowl counts have been carried out at Teesmouth since 1947 (P. Hogg, *pers. comm.*) and it is on these counts that much of this paper is based.

The real reasons for the apparently anomalous situation of an increasing duck population in a greatly reduced habitat are not obvious, although a number of possibilities can be suggested:

- (i) The food resources of the remaining mudflats are very high and may even have increased.
- (ii) Reclamation has somehow assisted the wintering ducks.
- (iii) Reduced wildfowling at Teesmouth has led to fewer disturbances.
- (iv) Wildfowl on the whole have become more numerous in Britain.
- (v) Elsewhere, the habitat has disappeared more swiftly than at Teesmouth, so that wildfowl have increased in the areas remaining.

An adequate food supply is the main requirement of any group of animals and the remaining areas of Seal Sands have been shown to hold a very high density of invertebrate food suitable for wildfowl and waders. Note that a great variety of animals occurs on the mudflats: no more than 78 species were recorded in a survey carried out in the late 1970s (Kendall, 1979). However, the density of some of these animals is very high.

The numbers of individuals vary from year to year and also fluctuate with the seasons, but such groups as the polychaete and oligochaete worms are often found in densities of 1-2 million/m² (Gray, 1976). The small gastropod *Hydrobia ulvae* has also been recorded in some tens of thousands/m² (Evans, 1978/79).

Such concentrations may seem inconsistent with a highly developed and polluted river. However, the Tees is now considerably cleaner than it was a decade ago. In 1970 the BOD loading was about 402 tonnes/day at the rivermouth, but by 1980 this had fallen to around 122 tonnes/day (Northumberland Water Authority). Another indicator of improved water quality is the more frequent occurrence of migratory fish such as Sea Trout *Salmo trutta* and Salmon *Salmo salar* in the upper reaches of the river (D.I. Griss, *pers. comm.*).

TABLE 3
Significance of Peak Shelduck Counts at Teesmouth

Season	Peak count (at Teesmouth)	Estimated population NW Europe	% NW Europe population	Reference
pre-1963	810	80-90 000	1.0	Goethe 1961
1966/1967	1400	80-90 000	1.7	Goethe 1961
1969/1970	4443	95 000	4.7	Ogilvie 1975
1975/1976	2728	ND		
1976/1977	3770	ND		
1977/1978	2165	125 000	1.7	Owen 1977
1978/1979	2098	125 000	1.6	Owen 1977
1979/1980	1613	125 000	1.2	Owen 1977

ND= No Data.

TABLE 4
Breeding Shelducks at Teesmouth
(Source: Teesmouth Bird Club, Personal Observation)

Year	Approx. no. of nesting pairs	Appox. no. young
1961	3	26
1962	4	31
1963	5	46
1964	4	27
1965	ND	ND
1966	8	63
1967	1	7
1968	4	24
1969	5	48
1970	8	64
1971	3	20
1972	ND	ND
1973	4	32
1974	13	106
1975	18	140
1976	8	67
1977	9	80
1978	10	88
1979	ND	ND
1980	5	40

ND= No Data.

In any case, as pointed out by Kendall (1976), the geography of Seal Sands ensures that the water which floods the mudflats at high tide is, in the main, fairly clean sea water containing very little polluted river water and it might well be that the highly diluted organic effluents from the main river channel provide an additional food source for the Seal Sands mud fauna.

Olney (1965) has reported *Hydrobia* as being the main prey of Shelducks, but detailed feeding studies at Teesmouth (Evans *et al.*, 1978, 1979) suggest that small polychaetes and oligochaetes form their main diet in that area. Thus, even though other birds such as Dunlin *Calidris alpina* and Redshank *Tringa totanus* also eat large numbers of these worms (Evans *et al.*, 1979), the very high concentrations of oligochaetes and polychaetes on Seal Sands should be sufficient to support the present winter density of about 3.8×10^5 Shelduck days.

TABLE 5
January Counts of Pochard and Goldeneye at Teesmouth

Year	Pochard	Goldeneye
1971	21	15
1972	—	—
1973	20	5
1974	19	17
1975	26	15
1976	74	39
1977	193	79
1978	120	107
1979	702	204
1980	107	182
1981	681	221
1982	820	440

There have been no detailed studies of the feeding habits of the other common surface feeding ducks at Teesmouth, although they would appear to be far less dependent than Shelducks on Seal Sands as a food source. Teal in particular have often been observed flying up Greatham Creek to feed on Cowpen Marsh and are often found in the area known as the Reclamation Pond and on the reedy pools which have developed on the reclaimed, but undeveloped, areas of mudflat. In fact the reclamation of the southern portion of Seal Sands could be partly responsible for the large increase in wintering Teal observed in recent years. The pools which have developed in these areas have been colonized by a number of aquatic plants such as *Scirpus* sp. which have been shown by Olney (1963) to be major food items of Teal. Further, due to reclamation of the southern part of Seal Sands, the Reclamation Pond has ceased to be affected by tides. This has allowed for considerably more vegetation growth, which has again resulted in a much improved feeding area for Teal.

The sharp, but relatively short-lived population increase of wintering Shelducks at Teesmouth between 1973/74 and 1976/77 was probably also in part due to reclamation activities. In 1970 a revetment wall was built eastwards from Greatham Creek across Seal Sands, effectively splitting the mudflats into two parts. Although the southern portion was scheduled for reclamation, it was not filled in immediately and, although the new porous wall allowed water to reach the southern flats, it did retard somewhat the ebb and flow of the tide, so creating areas where Shelducks could feed for longer periods (Blick, 1978; Evans, 1978/79). However, by 1975 the whole of the southern area of Seal Sands had been reclaimed and was totally unsuitable for feeding Shelducks, whose numbers reached an all-time low in 1977/78.

At this time, there was also increased human activity at Teesmouth, due to the reclamation operations themselves as well as to chemical plant construction and river dredging. The effects of such human disturbance on waterbirds can often be considerable, although some species react

more adversely than others. Studies carried out at Jamaica Bay Reserve, New York (Burger, 1981) showed that men working near ponds in the reserve flushed 60 per cent of the birds originally present. Further, at Teesmouth, Shelducks in particular have been found to be susceptible to human disturbance (P. R. Evans, *pers. comm.*). Gradually, however, as active construction work and dredging neared completion, the disturbance at Seal Sands diminished and this no doubt contributed to the recovery in duck numbers observed in the 1978/79 season.

Another factor which has had considerable influence on wildfowl disturbance in recent years is the greatly reduced shooting pressure on ducks at Teesmouth. Prior to the mid 1960s there was considerable (and often illegal) wildfowling along the sea wall bordering Seal Sands. However, since 1963, and with the backing of the local police force, land owners and wildfowling clubs, a Bird Wardening Scheme has operated at Teesmouth and this has greatly reduced the disturbance of birds through illegal hunting. Further, the presence of more bird watchers and the regular security patrols of the industries operating around the estuary have also helped to deter illegal shooting.

As will be seen from Figure 6, wintering Goldeneye and Pochard have greatly increased in recent years. The increase was not gradual, numbers of both species rising steeply from the 1975/76 season and continuing to increase at a rate very much greater than the British average (Figures 12 and 13).

Previously, large numbers of diving ducks in the estuary were usually the result of freezing weather conditions making inland feeding impossible. However, since the 1975/76 season, hard weather conditions cannot adequately explain the very large increase in Goldeneye and Pochard populations, which, in midwinter, feed mainly around the entrance to Greatham Creek. It has been known for some time that wintering sea-ducks, especially along the east coast of Scotland, feed extensively around domestic sewer outfalls (Thom, 1969; Milne & Campbell, 1973), and that this is particularly true of Goldeneye (Pounder, 1976). Thus it would appear to be very significant that in 1974, just prior to the marked increase of wintering Goldeneye and Pochard, a new sewage works at Billingham became fully operational, discharging domestic sewage into Greatham Creek. It is also possible that the increase in Goldeneye at Teesmouth is a result of Scottish birds moving down the coast in search of new feeding grounds. Campbell (1984) has reported a sharp decrease in wintering sea ducks along the Scottish east coast between Leith and Levenhall as a result of decreasing sewage discharges. Peak numbers of Goldeneye in particular decreased from 2334 in the 1975/76 season to 608 in the 1979/80 season, the same period in which increases were recorded at Teesmouth.

5. FUTURE OF SEAL SANDS

Although Seal Sands is an SSSI, the Tees and Hartlepool Port Authority (THPA) have the right to reclaim the area if they can show that the land is needed for port-related developments. Until the end of June 1984 the THPA also had the right to reclaim the whole of the remaining mudflats for any type of industrial development without recourse to normal planning procedures. They had held this privilege for over 60 years under the Tees Conservancy Act of 1920 and in recent years had tried to extend it beyond the expiry date of June 1984. Fortunately, pressure from environmental and conservation groups prevented this amendment being granted. However, the port authority can still develop Seal Sands if it can show that this is for port-related activities and it can still apply to reclaim the area for general industrial development, although in the latter case it would now have to obtain full planning permission.

With the removal of the imminent threat of reclamation by the Port Authority, and since none of the industries around the estuary appear to have any large expansion plans, the future of Seal Sands in the short term is probably fairly secure. However, at some time there will eventually be moves to reclaim the remaining mudflats, so in the meanwhile conservation organizations must try to develop a permanent conservation policy for the Tees Estuary.

6. ACKNOWLEDGEMENTS

I am grateful to Dr Peter Evans, D. I. Griss and Dorothy Johnston who read this paper in its draft form and made several suggestions for improvement. I would also like to thank ICI PLC for a contribution towards the cost of publication.

7. SUMMARY

There have been systematic winter wildfowl counts at the Tees estuary for over 30 years. The significance of these counts is discussed. It is shown that although over 75 per cent of the intertidal mudflats have been reclaimed since the early 1950s most species of wildfowl are more numerous today than they were three decades ago.

The estuary is of international importance for Shelduck with winter populations comprising at least 1 per cent of north-western European population, and often approaching 1.7 per cent (the all-time record being 4.7 per cent, i.e. 4443 birds in January 1970).

Mallard, Wigeon and Teal are also shown to be more numerous now than they were previously. Teal in particular have shown a large increase from under 20,000 duck days before 1974/75 to up to 155,000 duck days since. Ironically, these increases are probably partly due to reclamation activities which have inadvertently created more freshwater habitat suitable for surface feeding ducks.

There have also been very significant increases in winter Pochard (up to 56,000 duck days compared with pre-1974/75 figures of under 4000) and Goldeneye (over 25,000 duck days compared with former concentrations of under 3000). Such increases, especially in the case of Goldeneye, are possibly a result of increased food supply due to increased sewage disposal and a movement of birds south from traditional wintering areas off the east coast of Scotland.

The vulnerability of Teesmouth to further reclamation and development is briefly discussed.

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BOOK REVIEWS

Reptiles and Amphibians in Britain by Deryk Frazer. Pp. 256, with 50 figures and 16 monochrome plates. Collins. 1983. £11.00.

It is over thirty years since Malcolm Smith's *New Naturalist* on *British Amphibians and Reptiles* appeared. Since then there have been considerable inroads made into a deeper appreciation of the natural history of these animals which have embraced fields as diverse as feeding, reproduction, habitat preferences, physiological adaptation and behaviour. It is therefore appropriate that a new volume should appear which incorporates these research findings. Dr Frazer has done this with clarity and good judgement to provide a balanced, readable account.

The first chapter provides the reader with an introduction to the structure, function and general biology of the reptiles and amphibians, together with hints on how to study them in the field. The next five chapters provide accounts of each native species (and, briefly, a few exotic ones) under the headings which are typically, identification, distribution and habitat, breeding, behaviour, feeding and mortality. This structure provides very easy access to information about individual species. Throughout the account the author draws the reader's attention to the status of these animals which culminates in a chapter on their conservation.

This book is in the best traditions of the *New Naturalist* series and provides a most useful addition to the literature on our reptiles and amphibia. It is well illustrated with line drawings, maps and some excellent monochrome plates.

MJD

The Last Great Auk by Allan Eckert. Pp. 191. John Goodchild. 1964, reprinted 1984. £6.25.

This is the fictional story of the last Great Auk hatched in the 1840s on Eldey Island in Iceland. It tells of the long migration to Cape Hatteras, North Carolina, and how the birds cope with the vicissitudes of man and nature en route. On their return journey in the following spring they encounter men with guns who are hunting skins to stuff. The ignorance and greed of these professional hunters culminates in the destruction of the last Great Auk, with the slaughter of the last two animals and their large egg on Eldey Island in June 1844.

This horrific story shows how easily man's ignorance and greed can destroy not only this but many other species of wild life.

AVD

Nature Watcher's Directory by David Marsden. Pp. 224. Illustrated. Hamlyn. 1984. £6.95.

Collins Guide to the Countryside by A. and R. Fitter and J. Wilkinson. Collins. 1984. £11.95.

Recently a number of directories of birdwatching sites by different authors under a variety of imprints has appeared, but these books go farther, and birds are not the only organisms mentioned. In the *Nature Watcher's Directory* descriptions of about 200 sites are given, indexed by a regional map of Britain showing their locations, a habitat checklist and a list of nature reserves. Their geographical spread is quite good, although the eastern Midlands are rather sparsely covered, and some important places such as the Border Forest and Dungeness are not mentioned at all. The *Collins Guide* is attractively produced in a style familiar from many other books issued by this publisher. The competently written text rambles gently through half a dozen major types of urban, rural, and 'wild' habitats. The book will help the average person who is interested in nature but cannot really be called a naturalist to enjoy and appreciate more of what he sees.

FHB

Animal Architecture and Building Behaviour by Michael H. Hansell. Pp. 324, with 18 colour plates and numerous drawings. Longman. 1984.

This is a very interesting and unusual book. Although it includes much information about the building activities of animals of all kinds, from protozoa to mammals (actually the majority of builders are to be found amongst the insects and the birds), it is not concerned with providing anecdotal accounts of these activities in the manner of old-fashioned natural history books. It tackles such questions as what are the functions of the constructions built by animals? (the answers turn out to be very various), and especially how do animals build? The author's search for general principles takes him very far afield into such areas as the properties of building materials and the computer simulation of the movements of unknown organisms that left traces of their burrows in the fossil record. The book considers every aspect of its subject, and evolutionary considerations are not neglected. Lines of possible future enquiry are indicated. Building is a particular form of behaviour, and could be investigated experimentally; also investigations into the genetic basis for these kinds of behaviour should be fruitful. Amateurs as well as professionals could contribute to the study of this hitherto somewhat neglected aspect of biology.

FHB

The Red Sky at Night by John Barrington. Pp. 208. Michael Joseph. 1984. £8.95.

This is the story of a man who, after leaving university, decided to work as a shepherd on a 2,000 acre hill farm bordering the shores of Loch Katrine in Perthshire. In this book, he recounts with considerable skill not only his shepherding duties, but also the events of nature he witnessed in the course of his work. His observations on wildlife range over the birds of his domain, the other animals he encounters and the annual changes in the trees and flowers through the seasons. The descriptions of the shepherding and other farm activities are told with simple candour. In total the account provides a sensitive, well written story of the relationship between this man and his rural environment. The text is enhanced by the delicate and attractive line drawings of Paul Armstrong. A most enjoyable book.

AVD

Fellwalking with Wainwright by A. Wainwright and D. Brabbs. Pp. 224, with 219 coloured plates and 67 drawings. Michael Joseph. 1984. £12.95.

All those who have fallen under the spell of the Lake District will, sometimes in their lives, have discovered Wainwright. The hill drawings, the handwritten notes and the crumpled once-white dust covers are well known and will already be gracing many bookshelves. These seven field guides were intended to be put in the pocket or a rucksack and taken into the hills, to be studied *in situ*.

This latest book is certainly not a field guide. A revolution in colour printing and high quality reproduction in books has produced, over the last few years, a number of superb coffee-table books. This book is one of the most recent of these, succeeding in recapturing the very best of those days spent in the hills. The brilliant photographs by Derry Brabbs are a perfect complement to Wainwright, evoking many memories of the bright freshness of the hills, very few of the rainy, misty and muddy ones. Wainwright's style and prose is still there, now in clear type, his secret places of great beauty as well as his intimate love affairs with rock and water. One can sit on Blencathro and contemplate Sharp Edge to come or Helvellyn and Striding Edge. After a perspiring mental hike up and down the Langdale Pikes, it is a delight to learn that even the master prefers the easier route when given the choice. Crinkle Crags and Bowfell Pike, the Newlands and Coledale Rounds and Great Gable itself are evocative names in the firelight.

Alfred Wainwright MBE has written over forty other guide books since he retired. His seven guides to the Lake District on which this book was based were written whilst still in the harness of his profession as Borough Treasurer of Kendal. Derry Brabbs, forty years his junior, a distinguished young photographer of demonstrably great skill has captured brilliantly the soul of the Lakeland Fells.

When you acquire your copy, look at the back of the dust cover and admire the skill of the photographer in capturing so well the sheer contentment of a happy man.

BWF

THE MORPHOMETRY OF ROSTHERNE MERE, CHESHIRE

C. WOOF

Freshwater Biological Association, The Ferry House, Ambleside, Cumbria LA22 0LP

and

T. WALL

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INTRODUCTION

The small lakes or 'meres' of the Shropshire-Cheshire plain form the greatest concentration of natural standing waters in lowland Britain. Rostherne Mere, N.G.R. SJ745843, is the deepest, one of the largest and the most northerly of the meres; it is also a Grade 1 SSS1 of international importance (Ratcliffe 1977). Research work has been published on its water chemistry, sediments, phytoplankton, zooplankton, fish and benthic fauna — for references see Reynolds (1979) and Davison and Woof (1984).

The first scientific publication on the mere formed part of a 'Faunal Survey' initiated by Tattersall and Coward. They included a bathymetric map in their introductory paper (1914). According to Pritchard (1961), this map was compiled from soundings taken in 1912–13. No other bathymetric survey has been published since 1914. It was therefore decided to conduct a new survey, using modern equipment to record any changes which may have occurred in the mere over the last 70 years and to provide a background for current and future limnological studies.

SURVEY METHODS AND RESULTS

Our depth soundings were taken on 17 April 1984 when the surface of the mere was 20.54 m above the Ordnance Datum at Newlyn. This compares with the average water level for the mere for the years 1977 to 1983 of 20.61 m (Nature Conservancy Council data).

The instrument used in the survey was a magneto-striiction portable echo-sounding recorder, Model EY-M, manufactured by Simrad, Horten, Norway. The instrument's transducer was suspended in the well of a motorized punt driven at constant speed ($1.7 \pm 0.1 \text{ km hr}^{-1}$).

The transects, indicated in Fig. 1, were drawn on to a tracing of an Ordnance Survey 1:2500 map, 1967 revision. The constant speed of the boat enables the depth at any position to be determined by reference to the continuous depth-time trace produced by the instrument. From this information depth contours were constructed (Fig. 1). The area enclosed by a contour was measured by cutting out the traced contour and weighing. An area-depth profile (hypsographic curve) of the lake basin was obtained by drawing a smooth curve through the measured areas. From the curve the area at any intermediate depth can be estimated. The volumes were calculated using the areal data in Table 1 and approximating each 1 metre stratum to a trapezium.

DISCUSSION

Whilst the bathymetry of the mere as shown by the present survey is broadly similar to the map produced by Tattersall and Coward (1914), there are significant differences along the south and south-east shores where the present survey shows a much larger area of relatively shallower water. This confirms the findings of Dr J. W. Banks (unpublished data) in the early 1960s and Rogers (1972).

Part of the explanation for the discrepancy may lie in an increase in the area of the mere coupled with sediment accretion. There are signs of erosion along the southern slopes of the mere and the Ordnance Survey map revisions of 1893 and 1967 show the area of the mere as having increased from $0.479 \times 10^6 \text{ m}^2$ to $0.487 \times 10^6 \text{ m}^2$. In his unpublished records the late J. W. H. Osborne, keeper and warden at Rostherne Mere from 1952 to 1972, suggested that during the post-war period the flow of water from the mere had slowed down due to increased silting in the outlet following the demise of a sluice situated 1.2 km downstream from the mere. He maintained that this had in turn led to increased silting round the mouth of the outlet.

With regard to the deeper parts of the mere, the results of the present survey are similar to those of Tattersall and Coward (1914).

The low rainfall of the Shropshire-Cheshire plain and the small catchment areas of the mere basins combine to give them long retention times (Reynolds & Sinker 1976, Reynolds 1979).

TABLE 1
Morphometric data for Rostherne Mere

Depth m	Area $m^2 \times 10^{-6}$	Stratum m	Volume $m^3 \times 10^{-6}$	%
0	0.487	0—1	0.468	7.0
1	0.449	1—2	0.435	6.6
2	0.420	2—3	0.407	6.1
3	0.394	3—4	0.381	5.7
4	0.368	4—5	0.357	5.4
5	0.345	5—6	0.336	5.1
6	0.327	6—7	0.319	4.8
7	0.311	7—8	0.304	4.6
8	0.297	8—9	0.291	4.4
9	0.284	9—10	0.278	4.2
10	0.271	10—11	0.266	4.0
11	0.260	11—12	0.255	3.8
12	0.249	12—13	0.244	3.7
13	0.238	13—14	0.233	3.5
14	0.227	14—15	0.222	3.3
15	0.217	15—16	0.212	3.2
16	0.206	16—17	0.202	3.0
17	0.197	17—18	0.192	2.9
18	0.186	18—19	0.181	2.7
19	0.176	19—20	0.171	2.6
20	0.165	20—21	0.158	2.4
21	0.151	21—22	0.144	2.2
22	0.136	22—23	0.128	1.9
23	0.119	23—24	0.111	1.7
24	0.102	24—25	0.094	1.4
25	0.085	25—26	0.078	1.2
26	0.071	26—27	0.064	1.0
27	0.056	27—28	0.049	0.7
28	0.041	28—29	0.034	0.5
29	0.027	29—30	0.021	0.3
30	0.014	30—31	0.007	0.1

Max depth 31.0 m. Mean depth 13.6 m. Total volume $6.64 m^3 \times 10^6$.

Note. The area figures presented in italics are those measured by weighing.

The catchment area of Rostherne Mere is approximately $9 \times 10^6 \text{ m}^2$ (Rogers 1975). The mean annual rainfall for the years 1951–1980 recorded at the nearest climatological station, which is situated at Manchester Airport, 7 km east of the mere, was 80 cm. Evaporation probably accounts for about 45 cm of this (Penman 1950). Thus the catchment might shed $3.15 \times 10^6 \text{ m}^3 \text{ annum}^{-1}$ of the residual rainfall to the mere. If one assumes that the ground water catchment corresponds to the surface catchment it would then take an average 2.1 years to displace the volume of Rostherne Mere.

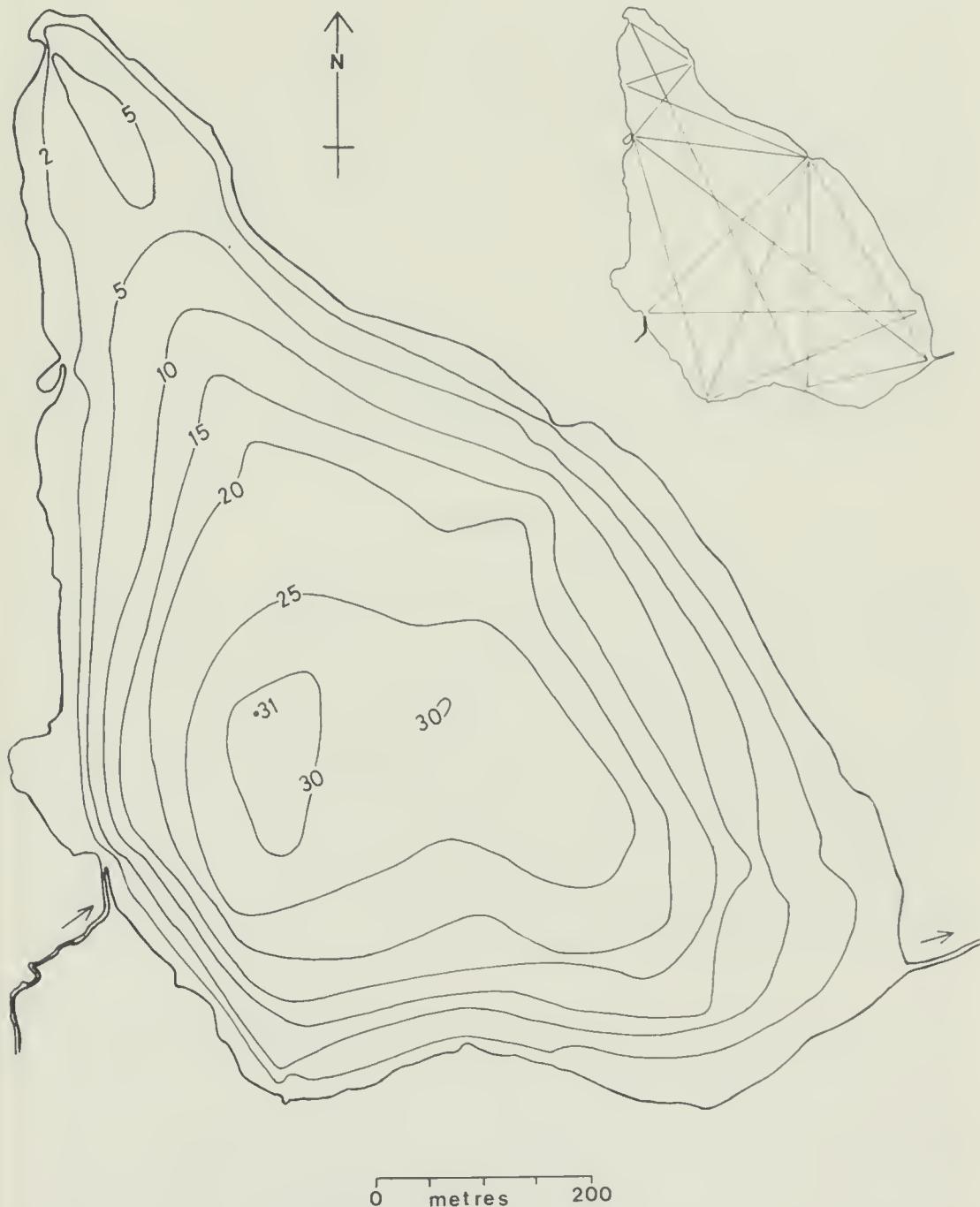


FIGURE 1

Bathymetric map of Rostherne Mere. Depth contours in metres. Inset: Echo Sounding transects. (Crown copyright reserved.)

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BOTANICAL REPORT FOR 1983

FLOWERING PLANTS AND FERNS

All the recorders wish to thank members who have contributed to these reports. Names of contributors are given the first time they appear in each vice-county list and thereafter initials are used. The figures indicate 10 km grid squares. *new vice-county record.

EAST YORKSHIRE (V.C. 61) (F. E. Crackles)

Work on the East Riding Flora has continued. I am particularly grateful to the Botanical Section for holding two excursions in V.C. 61 to collect tetrad map records in under-recorded areas. Both the excursion to water-meadows north of Bubwith and that to the Boothferry Bridge, Barmby-on-the-Marsh areas were highly successful.

A search for *Juncus effusus* × *J. inflexus* was rewarded by the discovery of a good population of the hybrid with plants of *Juncus effusus* at the edge of the western lake of Rise Park, the other parent occurring along other stretches of the same lake edge. This is a first vice-county record. A second locality for *Asperula cynanchica* near Settrington only a few miles from its well known station, is another notable discovery.

Asplenium adiantum-nigrum L. Under disused railway station platforms, Sigginsthorpe 54/14 and Patrington 54/32; F. E. Crackles. On old walls, Bridlington Priory 54/16 and Wctwang Church 44/95; E. Chicken.

Clematis vitalba L. Patrington railway station 54/32; F.E.C.

Sagina maritima Don. Cliff top, Skipsea 54/15; F.E.C.

Spergularia rubra (L.) J. & C. Presl. Disused railway, Hollym 54/32; F.E.C.

Sedum telephium L. Disused railway, near Asselby 44/72; Y.N.U. Bot. Sect. Excursion.

Sempervivum tectorum L. On old wall, Goodmanham church 44/84 and on cottage roof, Thwing 54/07; E.C.

Oenanthe crocata L. Asselby Island; Y.N.U. Bot. Sect. Excursion and Laxton Clough; R. Hunt. All three known localities for this rare East Riding species are for 44/72.

Parietaria diffusa Mert. & Koch. On station brickwork, Patrington 54/32; F.E.C.

**Salix alba* L. × *S. pentandra* L. = *S. × ehrhartiana* Sm. Firby Wood 44/76; Mrs E. Bray, conf. L. Howitt.

Orobanche elatior Sutton Ganton Wold 44/97; R. Jefferson.

Asperula cynanchica L. Near Settrington 44/87; R.J. 2nd extant record.

Stachys palustris L. × *S. sylvatica* L. = *S. ambigua* Sm. Near Boothferry Bridge 44/72 and on a bridge, in a hedgerow and as a garden weed at Barmby-on-the-Marsh 44/62; Y.N.U. Bot. Seet. Excursion, det. F.E.C.

Bidens tripartita L. By R. Ouse, near Boothferry Bridge 44/72; Y.N.U. Bot. Sect. Excursion. Bubwith 44/73; C. Yeates.

Alisma lanceolatum With. By R. Derwent, Barmby-on-the-Marsh 44/62; D. Grant.

**Juncus effusus* L. × *J. inflexus* L. = *J. × diffusus* Hoppe Rise Park 54/14; F.E.C.

Festuca pratensis Huds. × *Lolium perenne* L. = × *Festulolium loliumaceum* (Huds.) P. Fourn. Bank of R. Derwent, near Bubwith 44/73 and in river-side meadow, Barmby-on-the-Marsh 44/62; Y.N.U. Bot. Sect. Excursions.

**Festuca arundinacea* Schreb. × *Lolium multiflorum* Lam. River bank, Bubwith 44/73; Y.N.U. Bot. Sect. Excursion, det. F.E.C.

NORTII-EAST YORKSHIRE (V.C. 62) (T. F. Medd)

Dryopteris borreri × *filix-mas* = *D. × tavelii* Rothm. Haugh Wood, Pickering 44/88; B.S.B.I. Excn.

Ranunculus sardous Crantz Felled woodland, Hutton Hill near Malton 44/76; T.F.M.

Ranunculus omiophyllus (F. W. Schultz) Ten. Danby Rigg 45/70; Y.N.U. Excn.

Aquilegia vulgaris L. Haugh Wood, Pickering 44/88; B.S.B.I. Excn.

Viola reichenbachiana × *riviniana* = *V. intermedia* Reichb. Hovingham Woods 44/67; York & District F.N.S.

Trifolium europaeum L. Danby Rigg 45/70 and Gerrick Moor 45/71; Y.N.U. Excn.

Scrophularia umbrosa Dumort. Banks of R. Foss, Strensall 44/66; Miss J. Lambert.

Crepis paludosa (L.) Mocnch Pinkney & Gerrick Woods 45/71; Y.N.U. Excn.

Narthecium ossifragum (L.) Huds. Castleton Rigg 45/60 and Gerrick Moor 45/71; Y.N.U. Excn.

Allium scorodoprasum L. Banks of R. Ouse, Beningbrough Park 44/55; York & District F.N.S.

Listera cordata (L.) R. Br. Gerrick Moor 45/71; Y.N.U. Excn.

Milium effusum L. Pinkney & Gerrick Woods 45/71; Y.N.U. Excn.

SOUTH-WEST YORKSHIRE (V.C. 63) (D. R. Grant)

Ophioglossum vulgatum L. Old railway, Stourton 44/32; T. Schofield.

Ranunculus omiophyllus (F. W. Schultz) Ten. Near Watersheddles Reservoir, Stanbury 34/93; D. R. Grant.

Cardaria draba (L.) Desv. Methley 44/32; D.R.G.

Rorippa amphibia (L.) Bess. Canal, Thornhill 44/21; E. Thompson.

Viola lutea Huds. Near Wainstalls, Halifax 44/02; Mrs L. Lockwood.

Montia sibirica (L.) Howell Earlsheaton 44/22; C. Braham.

Malva moschata L. Pollington 44/61; E.T.

Rhamnus catharticus L. Sykehouse 44/61; E.T.

Lathyrus nissolia L. Old railway. Stourton 44/32; C.Yeates.

Rubus saxatilis L. Ogden Clough, Halifax 44/03; Y.N.U. Excursion.

Prunus cerasifera Ehrh. Kilner Bank. Huddersfield 44/11; B. & J. Lucas.

Circaea intermedia Ehrh. Luddenden Dean 44/02; Halifax Scientific Society Excursion.

Foeniculum vulgare Mill. Smithies, Barnsley 44/30; D.R.G.

Oenanthe fistulosa L. Rawcliffe 44/62; T.S.

O. crocata L. Ardsley, near Barnsley 44/40; J.Lunn.

Bryonia dioica Jacq. Near Frickley Church 44/40; Ackworth 44/41; D.R.G.

Rumex alpinus L. Near Seamonden Dam 44/01; F. Murgatroyd.

Humulus lupulus L. Near Hickleton 44/40; D.R.G.

Populus tremula L. Woodkirk 44/22; E.T. Swinton 44/49; D.R.G.
Salix pentandra L. New Park Spring, near Barnsley 44/40; J.L.
Lathraea squamaria L. Triangle, Halifax 44/02; C. Pilling.
Calamintha ascendens Jord. Stainton 44/59; R. Smith.
Galium mollugo L. Hoyland Bank (introduced with grass seed) 44/21; Dr Ll. Evans.
Sambucus ebulus L. Railway bank, Cleckheaton 44/12; E.T.
Dipsacus fullonum L. Kilner Bank, Huddersfield 44/11; B. & J.L.
Pulicaria dysenterica (L.) Bernh. Carleton Moor, Skipton 34/94; T.S.
Senecio fluiatilis Wallr. Healey Mills, Ossett 44/21; D.R.G.
Alisma lanceolatum With. Canal, Calverley 44/22; D.R.G. Canal, Elland 44/12; T.S.
Dactylorhiza praetermissa (Druce) Sóo Old railway, Stourton 44/32; C.Y.
Acorus calamus L. Canal, Thornhill 44/21; E.T.
Carex demissa Hornem. Kilner Bank, Huddersfield 44/11; B. & J.L.
C. pseudocyperus L. Gowdall 44/62; E.T.
C. divulsa Stokes Fenwick 44/51; D.R.G.
C. spicata Huds. Old railway, Stourton 44/32; T.S.
Calamagrostis epigejos (L.) Roth Old railway, Stourton 44/32; D.R.G.
Alopecurus myosuroides Huds. Fenwick 44/51; D.R.G.

MID-WEST YORKSHIRE (V.C. 64) (L. Magee)

Reports were received from eight people with a total list of 88 species. Although there were only a small number of new species for 10 km squares (Atlas records) most of the records were for uncommon species or those with a very local distribution.

D. R. Grant recorded *Eleocharis austriaca* from near Austwick seen on the Y.N.U. excursion to Moughton. This appears to be the first station for the Lune drainage. He also confirmed *Eleocharis uniglumis* from Stocks Reservoir. This plant was first seen in 1982 and confirmed in 1983 by Dr Sledge.

The colony of *Tulipa sylvestris* at Cattal is being conserved by the land owner and is flourishing under protection.

Lycopodium clavatum L. Black Fen, Bramham Park 44/44; C. Hartley.
Equisetum sylvaticum L. Several sites in Washburn Valley 44/15; L. Magee & T. Schofield.
Thelypteris phegopteris (L.) Slosson Brandstone Beck, Greenhow 44/16; R. Smith.
Polystichum aculeatum (L.) Roth Glasshouses 44/16; E. Thompson.
Caltha palustris ssp. *minor* (Mill) Clapham S.W. end Fewston Reservoir 44/15; L.M.
Malva moschata L. Swinsty Reservoir 44/15; L.M.
Erodium cicutarium (L.) L'Hér. Thruscross 44/16; L.M.
Saxifraga hypnoides L. Greenhow Hill 44/16; Dr Ll. Evans.
Silaum silaus (L.) Schinze & Thell. Acaster Malbis 44/54; D. R. Grant.
Eupatorium cannabinum L. Roadside below Hawkswick Wood 34/97; Miss H. Lefèvre.
Convallaria majalis L. Dunmow Hill. Confirmation of old record 34/75; D.R.G.
Colchicum autumnale L. Black Fen, Bramham Park 44/44; C.H.
Juncus subnodulosus Schrank Ellington Banks, Ripon 44/44; D.R.G.
Iris pseudacorus L. Low Greenfield (introduced) 34/87; H.L.
Typha latifolia L. Low Greenfield (introduced) 34/87; H.L.
Eleocharis uniglumis (Link) Schultes Stocks Reservoir 34/75; D.R.G. First seen 1982, conf. Dr W. A. Sledge 1983.
E. austriaca Hayek Moughton Y.N.U. excursion (first record for Lune drainage) 34/77; D.R.G.
Carex pendula Huds. Site of old reservoir, Arthington 44/24; L.M.
C. acuta L. Swinsty Reservoir 44/15; L.M.
C. disticha Huds. Swinsty & Fewston Reservoirs 44/15; L.M. Acaster Malbis 44/54; D.R.G.
Vulpia bromoides (L.) Gray Near Wetherby Racecourse 44/44; D.R.G.
Puccinellia distans (Jacq.) Parl. Roadside, Walton near Wetherby 44/44; D.R.G.
Calamagrostis epigejos (L.) Roth West Wood, Bramham 44/44; T.S.
C. canescens (Weber) Roth Near Wetherby Racecourse 44/44; D.R.G.

NORTH-WEST YORKSHIRE (V.C. 65) (T. F. Medd)

**Epipactis phyllanthes* G. E. Smith Riehmond 45/10; F. Horsman and Mrs J. Holloway.

CASUALS AND ADVENTIVES (E. Chieken)

For 1983 a total of 95 records for 57 taxa were received from five correspondents. The following list is of plants not reported in the years 1980-1982.

Lunaria rediviva L. (64) Pinfold Lane, Swinsty 44/25; L. Magee.

Amaranthus albus L. (63) Rothwell and Langley 44/32; J. Martin.

Amaranthus quitensis Kunth (63) Rothwell 44/32; J.M.

Amaranthus blitoides S. Watson (63) Langley 44/32; J.M.

Amaranthus deflexus L. (63) Langley 44/32; J.M.

Lupinus polyphyllus Lindl. (63) Normanton railway sidings 44/32; D. R. Grant.

Medicago sativa L. (63) Beside lay-by, Clifton interchange 44/12; Mrs J. Lucas.

Medicago minima (L.) Bart. var. *brevispina* Benth (63) Rothwell 44/32; J.M.

Galega officinalis L. (64) Warren Lane, Arthington 44/24; L.M.

Soleirolia soleirolii (Req.) Dandy (62) Bridge at Sealby 54/09; B.S.B.I. meeting via T. F. Medd.

Solanum cornutum Lam. (63) Langley 44/32; J.M. and C. Yeates.

Datura ferox L. (63) Rothwell, Langley and Newton Hill 44/32; J.M.

Valeriana pyrenaica L. (64) Roadside, Gledstone Hall, West Marton 34/85; D.R.G.

Artemisia anethifolia Weber ex Steehm. (63) Newton Hill 44/32; J.M. det. E. J. Clement.

Lactuca serriola L. (63) Kirkhamgate 44/22; J.M.

Verbesina encelioides (Cav.) Benth. and Hook. fil. ex A. Gray (63) Langley 44/32; J.M. det. E.J.C.

Cynodon dactylon (L.) Pers. (63) Rothwell 44/32; J.M.

Echinochloa crus-galli (L.) Beauv. (63) Rothwell and Langley 44/32; J.M.

YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1983

compiled by

C. PELLANT and H. S. PELLANT

DANBY and CASTLETON (VC 62), 4 and 5 June (Dr M. A. Atherden)

The area studied on the 684th YNU excursion lies astride not only four 10 km grid squares but also two counties, so recording presented a challenge for the large number of members who attended. The area, well known to earlier ecologists, was described in Frank Elgee's *Moorlands of North-east Yorkshire* (1912) and in Canon Atkinson's *Forty Years in a Moorland Parish* (1892). In the north, the underlying geology is Upper Jurassic Kellaways Rock sandstone, with clay underlying Loekwood Beck Reservoir. Most of the area is on Middle Jurassic sandstones and shales, but river erosion by the Danby Beck and Little Fryup Beck in the south has exposed the older Lias shales of the Lower Jurassic in the valleys.

Several different habitats were studied, including moorland, bog, open water and woodland. Starting in Cleveland on the Saturday, a small party visited Loekwood Beck Reservoir, by kind permission of the Northumbrian Water Authority. The main party walked south from Gerriek picnic site, on the A171 Whitby-Guisborough road, across Gerriek Moor. Although superficially a rather ordinary stretch of moorland, this proved on closer examination to hold some very pleasant surprises, particularly for the botanists. Some of the party crossed the county boundary into North Yorkshire to reach Ewe Crag Slaek — a peat-filled glacial drainage channel, whose vegetation was mapped in detail by Frank Elgee in 1912 and which shows a similar mosaic of bog communities today. In the afternoon, the public footpath was followed northwards from Gerriek picnic place through farmland to the Pinkney and Gerriek Woods SSSI. This woodland occupies the steep valley sides of Skate Beck and Stubdale Beck, both tributaries of Kilton Beck. It is one of the best surviving semi-natural deciduous woodlands in Cleveland and the walk through it in sunshine was much enjoyed by all the party. Only parts of the woodland are accessible to the public, so the party turned eastwards and then southwards along green lanes through agricultural land, eventually rejoining the main road to complete a round trip of 5½ miles.

Sunday was spent in North Yorkshire, to the south of the Esk valley. The weather was cooler and rather misty at first as the party visited the little bog at St Helena, which has formed behind a landslip on the western side of Danby Dale. The walk that followed took members down the dale and up and over the moorland on Danby Rigg, along an old track known as the Jack Sledge Road, leading into Little Fryup Dale. In the afternoon the weather improved as the party made their way along the ridge between Great and Little Fryup Dales and into Crag Wood. This interesting wood has survived on the steep north-facing slope beneath Danby Crag. A particularly interesting feature of part of the wood is the occurrence of some very old holly trees, which were mentioned by Elgee in 1912 and are still there today.

The meeting and tea were held in the Danby Lodge National Park Centre, by kind invitation of Mr P. Bryan, the Director. In the absence of the President, the meeting was chaired by Canon B. Kitchen. Miss J. Robertson proposed a vote of thanks to the Divisional Secretary for organizing the meeting and to the staff of Danby Lodge for their excellent facilities and warm welcome.

Ornithology (C. G. Shields)

Lockwood Beck Reservoir has a variety of habitats ranging from moorland to plantation. Despite windy weather, a reasonable list was obtained. A pair of Mallard had two young, one brown and one yellow. House Martins were nesting in the cottages and about 20 birds were present. Two Tree Pipits were observed, and both Linnet and Redpoll were present in the trees. Three Reed Buntings were singing and a Whinchat was seen in the open area. There were at least eleven Willow Warblers singing, and both Curlew and Wood Pigeon were noted flying over. In the Gerrick Moor area were Ring Ouzel, Cuckoo, Short-eared Owl, Pied Wagtail, Snipe, Lapwing, Golden Plover, Curlew (with four young) and a Pheasant's 15 cold eggs. A ringtail Hen Harrier was seen being mobbed by a group of Lapwings.

Saturday afternoon was spent in Pinkney and Gerrick Woods. Few birds were singing and the dense vegetation made observation difficult. A Great Spotted Woodpecker called, and both Jay and Redpoll were seen. A Yellowhammer was seen near Thatchmire Farm.

On Sunday morning, Castleton Rigg was shrouded in cloud, but three Ring Ouzels, a Cuckoo and a Golden Plover were seen near St Helena. Crag Wood was visited in the afternoon when the weather had improved, and the edges proved particularly good for warblers, with Whitethroat, Lesser Whitethroat, Blackcap, Garden Warbler and Willow Warbler recorded. Redstart was also present. Those who walked over Danby Rigg noted four Common Gulls, four Curlews, a Wheatear and a Whinchat.

Mammals and Other Vertebrates (C. Pellant)

On Saturday 4 June, Common Lizards were disturbed by a number of members. In the evening a large, dark Adder was seen for some time near the stream in Gerrick Haw. Common Frogs were reported from the wetter areas of the moorland. During both days signs or sightings of Rabbit, Hare, Hedgehog, Mole, Roe Deer and Fox were reported.

Lepidoptera (C. Pellant)

In the warm, sunny weather on 4 June a number of butterflies were on the wing. On the moorland there were Green Hairstreaks, *Callophrys rubi*, and Small Tortoiseshells, *Aglaia urticae*. Moths in this habitat included Brown Silver-line, *Lithina chlorosata*, Common Heath, *Ematurga atomaria*, and Latticed Heath, *Chiasmia clathrata*. Larvae of the Northern Eggar, *Lasiocampa quercus* subsp. *calluna*, and Ruby Tiger, *Phragmatobia fuliginosa*, were found. In the afternoon many Small Tortoiseshells, *Aglaia urticae*, and the occasional Peacock, *Inachis io*, were basking along the lane leading to Pinkney and Gerrick Woods. Large Whites, *Pieris brassicae*, were also present, and in the woods Green-veined Whites, *P. napi*, were flying. It was disappointing not to see any Orange Tips, *Anthocharis cardamines*, many members from further south having already seen them this year.

The morning of Sunday 5 June was very cool and misty on the high moors at St Helena. A

dead male Emperor Moth, *Saturnia pavonia*, was found, and later in the day, when the sun shone, Small Whites, *Pieris rapae*, were flying in the valleys.

Much of the above information was supplied by Mrs J. Payne.

Arachnology (C. J. Smith)

The fine weather was tempered by a high wind which made collecting difficult and by the late season which limited the number of mature species at a time when most of the early summer species should have been available. H. Britten records many species in the more northerly parts of the Yorkshire Moors during the 1930s, while D. Horsfield and others covered a similar area in the late 1970s. Few records exist for the Esk Valley to the west of Egton Bridge, and even fewer for the moors to the south of the valley. As a result, many records in the Danby and Castleton region during this excursion are first records for the NZ 60 square. The outstanding record of this excursion is undoubtedly a handsome, well-preserved *Leptophantes angulatus* ♂ from Gerrick heather moor (NZ 702120) at an altitude of about 700 ft. The only other records for this species in the (old) county of Yorkshire are all grouped around Malham.

The complete list of species recorded is as follows:

<i>Micaria pulicaria</i> C♀	<i>W. cuspidata</i> *D♀
<i>Clubiona reclusa</i> E♀	<i>Dicymbium tibiale</i> *E♂
<i>C. stagnatilis</i> *D♂	<i>Gongylidium rufipes</i> *A♀, *D♀
<i>C. trivialis</i> C♂	<i>Dismodicus bifrons</i> *A♂♀, *B♂, C♂♀, *D♂♀
<i>Xysticus cristatus</i> *A♀	<i>Hypomma bituberculatum</i> *C♀, D♂♀
<i>Pardosa palustris</i> *E♂	<i>Gonatium rubens</i> B♀, C♀
<i>P. pullata</i> *D♂, E♀	<i>Peponocranium ludicum</i> B♂♀, C♀, E♀
<i>P. amentata</i> A♀, D♂♀	<i>Pocadicnemis pumila</i> B♀, *D♂♀
<i>P. lugubris</i> *D♀	<i>Oedothorax fuscus</i> D♂♀
<i>Ero cambridgei</i> B♀	<i>O. agrestis</i> *D♂
<i>Theridion sisyphium</i> D♂	<i>Araeoncus humilis</i> *D♀, E♂♀
<i>Enoplognatha ovata</i> Djuv.	<i>Erigone atra</i> D♂
<i>Robertus lividus</i> *D♂♀, E♀	<i>Porrhomma pygmaeum</i> *B♀, E♀
<i>Pholcomma gibbum</i> C♀	<i>Bathyphantes gracilis</i> *D♀
<i>Tetragnatha extensa</i> A and D (subadults♀)	<i>B. nigrinus</i> *D♂♀
<i>Pachygnatha clercki</i> *A♀, *D♀	<i>Kaestneria pullata</i> *D♂
<i>P. degeeri</i> *A♂, C♂	<i>Poeciloneta globosa</i> C♀, *D♂♀, E♂
<i>Meta mengei</i> *A♂♀, *B♂♀, D♂♀	<i>Leptophantes obscurus</i> B♂♀
<i>Araneus diadematus</i> B and C (immatures)	<i>L. tenuis</i> C♀
<i>A. cornutus</i> *C subadult♀	<i>L. zimmermanni</i> B♂
<i>A. cucurbitinus</i> *A♀	<i>L. angulatus</i> *B♂
Linyphiidae	<i>Linyphia montana</i> *D♂
<i>Ceratinella brevipes</i> B♂♀, C♀	<i>L. clathrata</i> *A♀, B♀, *E♂♀
<i>Walckenaera acuminata</i> *D♀	<i>Microlinyphia pusilla</i> *A♀, B♂
<i>W. unicornis</i> *A♀, *D♀	

* indicates a first record for the appropriate 10 km square.

A=Swainby (roadside) NZ 478024, B=Gerrick (heather moor) NZ 702120, C=Gerrick (gorse and grass) NZ 702119, D=Castleton (riverside) NZ 696083 and E=Sleddale (wooded stream) NZ 636098.

Mollusca (A. Norris)

Four 10 km squares were visited over the weekend, NZ 60, 61, 70 and 71. Gerrick Wood and Avens Wood, with their streams, steep wooded valley sides and generally wet woodland, were particularly rich in species. The occurrence of old woodland species such as *Spermoea lamellata*, *Limax cinereoniger* and *Zenobiella subrufescens* is indicative of the old mixed woodlands of this part of the county.

Flowering Plants and Ferns (Mrs J. E. Duncan)

At first sight, Gerrick Moor, with much heather, bilberry and bracken, did not look too promising but hopes rose with the first sighting of *Trientalis europaea* on the ridge. It was later found in abundance lower down, flowering amongst the dead bracken fronds of last year. Then investigation of the different flushes yielded a most interesting list, including *Equisetum sylvaticum*, *Viola palustris*, *Potentilla palustris*, *Hydrocotyle vulgaris*, *Menyanthes trifoliata*, *Pedicularis palustris*, *Valeriana dioica*, *Narthecium ossifragum*, and (the find of the day) a healthy little colony of *Listera cordata* growing in *Sphagnum*. *Eriophorum angustifolium* and *E. vaginatum* were present, and the sedges showing at this time were *Carex binervis*, *C. nigra* and *C. pilulifera*.

Pinkney and Gerrick Woods, mixed broad-leaved woodlands, had a good variety of tree and shrub species and a rich ground flora. Walking through the two woods without detailed study was enough to show their ecological difference; several species were seen in only one of the woods. Notable records were: Pinkney: *Cardamine amara*, *Chrysosplenium oppositifolium*, *Valeriana officinalis*, *Crepis paludosa*, *Orchis mascula*, *Carex sylvatica*, *Melica uniflora*; Gerrick: *Silene dioica*, *Geum x intermedium*, *Circaeae lutetiana*, *Scrophularia nodosa*, *Viburnum opulus*, *Carex sylvatica*, *C. remota*, *Brachypodium sylvaticum*, *Milium effusum*. The total list included species seen between the woods, two being *Myosotis discolor* and a large colony of *Saxifraga granulata*. *Vicia sylvatica* was growing at the edge of a nearby piece of woodland.

Next day the vegetation of the landslip bog near St Helena below Castleton Rigg was carefully examined. *Juncus effusus*, both cotton grasses and *Erica tetralix* were amongst the abundant species, others of interest including *Oreopteris limbosperma*, *Viola palustris*, *Drosera rotundifolia*, *Myosotis secunda* and *Narthecium ossifragum*. Only one or two plants of *Trientalis* were found, but it was plentiful on the continuation of the walk to Crag Wood, and *Ranunculus omiophyllus* was also found. The approach to Crag Wood was very wet, and in the wood itself extensive wet patches were made striking by well flowering *Caltha palustris* and *Cardamine amara*. Other herbaceous species in and near the wood included *Corydalis claviculata*, *Silene dioica*, *Chrysosplenium oppositifolium* and *Hyacinthoides non-scripta*, while trees and shrubs noted were: *Acer pseudoplatanus*, *Ilex aquifolium*, *Sorbus aucuparia*, *Betula pubescens*, *Alnus glutinosa*, *Corylus avellana*, *Quercus* sp. and *Fraxinus excelsior*.

Mycology (A. Hawkswell)

On 4 June, the following species were found on Gerrick Moor: *Calocera cornea* (on rotting wood), *Entoloma porphyrophaeum*, *Galerina paludosa*, *G. sphagnorum*, *G. vittaeformis*, *Marasmius androsaceus*, *Mitrula paludosa*, *Panaeolus rickenii* and *Tricholoma gambosum* (in profusion). Pinkney and Gerrick Woods provided: *Peziza cerea* (on rotting cardboard), *P. repanda*, *Paxina acetabula*, *Coprinus atramentarius*, *Daldinia concentrica*, *Exidia glandulosa*, *Peniophora quercina*, *Stereum hirsutum*, *Melampsora aecidioides* (on *Mercurialis perennis*), *Ustilago violacea* (on anthers of *Silene dioica*) and *Lycogala epidendrum*.

The following day, *Triocholoma gambosum* (in profusion) and *Galerina paludosa* were found in the landslip bog at St Helena.

Bryology (Miss J. Robertson)

Saturday morning was spent on Danby Low Moor. In springs and marshes here were extensive patches of *Sphagnum palustre*, *S. recurvum*, *S. cuspidatum*, *S. papillosum*, *S. capillifolium* and *S. fimbriatum*, with *Aulacomnium palustre*, *Polytrichum commune*, *Philonotis fontana* and *Pleurozium schreberi*. Drier peaty soil nearby was colonized by *Orthodontium lineare*, *Polytrichum juniperinum*, *P. piliferum*, *Campylopus pyriformis*, *Plagiothecium undulatum*, with *Hypnum jutlandicum* under heather and the hepaticas *Gymnocolea inflata* and *Barbilophozia floerkii*.

After lunch, in the deciduous woodland of Gerrick Wood, with its stream and calcareous flushes, we found numerous common species on bare soil, *Cinclidotus fontinaloides*, *Rhynchostegium riparioides* and *Chiloscyphus polyanthos* covering rocks in the stream, and

Cratoneuron filicinum and *Brachythecium rivulare* on adjacent banks. The only epiphytes seen were *Dicranoweisia cirrata* and *Hypnum cupressiforme*, with *Metzgeria furcata* in one site and *Lophocolea heterophylla* on rotting logs.

On Sunday, *Campylopus introflexus*, *Dicranella heteromalla*, *Lophozia attenuata*, *L. ventricosa*, *Diplophyllum albicans* and *Calypogeia fissa* were added to the list from the peat and grit slopes of Castleton Rigg. An old roadside wall below provided more alkaline niches for *Barbula recurvirostra*, *Funaria hygrometrica*, *Encalypta streptocarpa* and *Bryum inclinatum*. Rocks in Danby Dale stream were covered by *Scapania undulata*, with *Lophocolea cuspidata* on tree boles nearby. The hepatic *Bazzania trilobata*, uncommon in VC 62, was established on one sandstone boulder in old Holly and deciduous woodland south of the Esk, with *Tetraphis pellucida*, *Lepidozia reptans*, *Dicranum majus* and *D. scoparium* nearby. *Dicranum tauricum* and *Hypnum mammillatum* occurred here on tree boles. On Alder boles in the flood zone of the River Esk grew the rare *Myrinia pulvinata* (the first record for VC 62 this century), with some *Leskeia polycarpa*. *Fontinalis antipyretica* covered submerged rocks.

Mr T. Bloekeel has very kindly acted as referee.

STOCKINGDALE (VC 61), 25 June (B. S. Pashby)

On a pleasant, warm day with hazy sunshine, most of the time was spent in Stockingdale, which comprises a Beech and Ash woodland, an open grassland valley with much scrub, and a small wetland area with a dew-pond at the bottom. Other areas visited included Spel Howe (on the northern escarpment of the Wolds), Well Springs (Flotmanby Carrs) and Mr Philip Winter's farm at Muston. About forty members and associates attended the excursion.

It was unfortunate that the lack of bookings for tea at the Ship Inn, Muston, had led to the cancellation of prior arrangements. However, the Winter family came to the rescue and organized one of their barns into an impromptu meeting place for the presentation of reports, bales of straw making an excellent substitute for the customary chairs and tables. The Rev. B. Kitehen took the chair for the meeting, at which fourteen societies were represented. The chairman expressed thanks to Mr Piekering of Stockendale Farm for permission to park cars in his yard, to Mr Kitehen for permission to visit Spel Howe and to members of the Winter family for their help in many ways. He also thanked the Divisional Secretary for organizing the excursion.

Ornithology (B. S. Pashby)

The open grassland part of Stockingdale, like most Wolds valleys of this nature, is very poor in species; however two of these, Whinchat and Tree Pipit, are typical, and both were seen actively displaying, the Whinchat obviously having young, and the Tree Pipit indulging in its song flight. Whitethroat, Yellowhammer, Goldfinch and a family party of Long-tailed Tits were present in the scrub. In the wooded part of the valley, Garden Warbler, Willow Warbler and Spotted Flycatcher were the most noteworthy species among the more common thrushes and finches.

In the arable fields above the valley were Red-legged Partridge, Corn Bunting and a flock of Lapwings, and overhead a few Herring Gulls were making their way to the coast. The total of twenty-six species, while appearing low, was as high as could be expected in such habitats at this time of year.

Mammals (B. S. Pashby)

Rabbit and Brown Hare were both reported. Of two Badger setts in the areas visited, one was known to be occupied, as was a Fox's earth. A Short-tailed Vole put in an appearance when members invaded its territory.

Lepidoptera (Mrs J. Payne)

Twelve species of butterfly were seen, the Dingy Skipper, *Erynnis tages*, being the best recorded. As the meeting was 'early' in the season (this being a year of late appearances), it is likely that a later visit would add at least another five, making it a site of high butterfly incidence.

Among the moths, Geometridae were most in evidence, with Common Carpet, *Epirrhoe alternata*; Green Carpet, *Colostygia pectinataria*; Silver-ground Carpet, *Xanthorhoe montanata*, and Red Twin-spot Carpet, *X. spadicearia*, present. The Silver-ground Carpet was of an unusual pattern form. A single Marsh Pug, *Eupithecia pygmaeata*, was taken on the wing. Burnet moth cocoons were abundant on the grasses, and 5-spot (*Zygaena lonicerae*) and 6-spot (*Z. filipendulae*) Burnets emerged. The majority of the sample taken at different points in Stockingdale were *Z. filipendulae*, but some 10 per cent were *Z. lonicerae*. The Burnet Companion, *Ectypa glyphica*, was in attendance. Members of the Arctiidae seen were White Ermine, *Spilosoma urticae*, and Garden Tiger, *Arctia caja* (larvae). A short beating session produced a larva of the Short-cloaked, *Nola cucullatella*.

Coleoptera (M. L. Denton)

Although at first sight it looked as if the coleopterists in the party were in for a very interesting day, the area unfortunately proved unrewarding with the same common species uniformly distributed throughout the area. Even so, many new species were recorded for the 10 km square concerned. Prior to this visit, only four species of ground beetle had been recorded; a further thirteen species were added to the list, although only *Ophonus brevicollis* was notable. The following brightly coloured species were pleasing to see: *Cassida rubiginosa*, *Lochmaea crataegi*, *Chrysolina polita*, *C. staphylaea* and *Pyrochroa serraticornis*.

The general lack of species was also reflected at Well Springs (Flotmanby Carrs), the only new species encountered being *Hydrobius fuscipes* and *Agabus paludosus*.

Mollusca (A. Norris)

The molluscan fauna of Stockingdale was not typical of the open chalk grassland found in many areas of the Yorkshire Wolds, but was more representative of the scrubby hawthorn hedges of that area. A small quarry at the entrance to the dale proved to be the only locality in which any of the more typical grassland species occurred, *Candidula intersecta* and *Cernuella virgata* being recorded in small numbers.

Flowering Plants (E. H. Wear)

In Stockingdale, a total of ninety-two species was recorded, the most notable being some very fine stands of *Filipendula vulgaris* and *Helianthemum nummularium*. Other plants were *Primula veris*, *Orchis mascula*, *Conopodium majus*, *Linum catharticum*, *Galium verum*, *Cerastium arvense*, *Pilosella officinarum*, *Fumaria officinalis*, *Ulex europaeus*, *Cytisus scoparius*, *Sanguisorba minor*, *Silene vulgaris*, *Chaerophyllum temulentum*, *Conium maculatum*, *Viola hirta*, *Sherardia arvensis*, *Polygala vulgaris*, *Anagallis arvensis*, *Stellaria graminea*, *Carduus nutans*, and, at the dew-pond, *Ranunculus sceleratus*; three grasses were recorded: *Koeleria cristata*, *Briza media* and *Festuca ovina*.

Brief visits were made to Spel Howe, where much of the *Actaea spicata* was seen in fruit and several plants of *Listera ovata* were noted, and to Mr Philip Winter's farm at Muston to see *Berberis vulgaris* and *Euonymus europaeus*, both growing in hedgerows on the farm. Several clumps of *Heracleum mantegazzianum* were towering over farm machinery.

Bryology (Miss J. Robertson)

In the old-established, deciduous woodland in Stockingdale, a few very old Elders in a shaded site were colonized by the epiphytes *Orthotrichum pulchellum* (c.f.), *O. affine* and *O. diaphanum*. Common species on other trees were *Aulacomnium androgynum*, *Dicranoweisia cirrata*, *Amblystegium serpens*, *Orthodontium lineare*, *Plagiothecium denticulatum* and *Hypnum cupressiforme*. The dry woodland floor was covered with *Euryhynchium striatum*, *E. praelongum*, *E. swartzii*, *Plagiomnium undulatum* and *Mnium hornum*. *Pohlia nutans* and *Lophocolea heterophylla* covered rotting stumps.

Most of the valley was open grassland and too dry for many bryophytes, but the following species were present: *Pseudoscleropodium purum*, *Dicranum scoparium*, *Rhytidiodelphus squarrosus*, *Brachythecium rutabulum*, *Calliergon cuspidatum* and *Lophocolea bidentata*. *Ctenidium molluscum* was established in an old chalk pit, and the tiny, rare *Seligeria*

paucifolia was in fruit on one block of the exposed chalk. Further species recorded in the damper parts of the disused Staxton sand pit were: *Pleuridium subulatum*, *Leptobryum pyriforme*, *Brachythecium albicans* and the hepatic *Riccardia chamaedryfolia*.

Mr T. Bloekeel has very kindly acted as referee.

BALDERSDALE (VC 65), 2 July (F. B. Stubbs)

Enjoying a fine day, some forty members attended, seventeen societies being represented. Three areas were visited by various groups. The lower dale offered woodland and streamside, together with the banks of an abandoned railway. The upper dale, with a chain of reservoirs, was mainly grass upland. Fell Lane, a minor road near Romaldkirk, had richly varied verges; a small woodland and an abandoned quarry nearby were also of interest.

After tea at the Rose and Crown Hotel in Romaldkirk, the President, Dr Margaret E. Bradshaw, took the chair when reports were presented. Thanks were expressed to the farmers and owners of the several lands visited for their kind permission in allowing access.

Ornithology (M. J. A. Thompson)

Some thirty-two species of bird were either seen or heard during the visit to the area, mostly typical upland species. Besides Swallows and Swifts feeding in all three areas under surveillance, Sand Martins were noted over Blaekton Reservoir; they were probably nesting in its banks. Redshank, Snipe and Curlew were identified, with the latter species feeding young near the quarry site. High over Baldersdale Reservoir Golden Plovers were heard, and these, along with numerous Lapwings, made a pleasing addition. Wheatears were seen feeding young, and a pair of Oystercatchers flew back and forth between the two reservoirs, uttering their characteristic calls.

In the meadows around the Blaekton Youth Hostel, male Meadow Pipits were performing their territorial flights. Pied Wagtails were quite common, and, in addition, there was a pair of Yellow Wagtails in the area. Several Linnets were seen, a small party of these finches mobbing a lone Kestrel along the edges of Mawman Sike stream.

The woodland site next to Fell Lane produced the expected birds. Of note were a male Redstart, a Tree Pipit, Willow Warblers, a small party of Coal Tits and the call of the Greater Spotted Woodpecker. Spotted Flycatchers were very active on the wood edge, as were Blaekbirds, which were feeding young. Goldfinches were seen in the quarry site. Other birds noted during the day included Song Thrush, Robin, Wren, Starling, Wood Pigeon, Jay, Black-headed Gull and Pheasant, with chicks. Finally, a Dipper was noted in the upland area, flying along Mawman Sike.

Mammals and Other Vertebrates (M. J. A. Thompson)

Unfortunately, the YNU visit to Baldersdale produced few mammal and lower vertebrate records, in spite of a great deal of searching by members present. The recently published *Atlas of Yorkshire Mammals* by Colin Howes of Doncaster (*Naturalist* 108: 41-82) shows that, for the decade 1971 to 1981, the Pygmy Shrew, Red and Grey Squirrel, Field Vole, Stoat, Weasel and American Mink were present in the area. There are no bat records for the area, the nearest being a Pipistrelle record from Grinton in Swaledale. However, the outing did produce three, or possibly four, new 10 km mammal records for the mapping scheme. Moles were common, especially around Blackton Youth Hostel, as were Rabbit burrows, with the occasional Rabbit being seen. They were also noted at the Fell Lane site. In the old quarry next to Fell Lane, Dr Lloyd-Evans found the remains of a snail shell which had obviously been nibbled by a Bank Vole. Along the edges of Mawman Sike, a small feeder stream, there were a number of holes in the banks, possibly those of Water Vole, although no confirmatory evidence of these mammals' droppings was found. In spite of an extensive search of the woodland areas around Fell Lane, no owl pellets were found.

Tadpoles of the Common Frog were seen in two well oxygenated ponds on either side of the outlet stream of the Baldersdale Reservoir; they were also numerous in the small pond at the quarry site next to Fell Lane. A mature Common Lizard was seen on the road verge at Fell Lane, which, according to some members present, had been recorded in the area before.

Lepidoptera (Mrs J. Payne)

The day was not favourable for seeing lepidoptera owing to the high wind. Six species of butterfly were recorded, the Small Heath, *Coenonympha pamphilus*, being the most frequent. In a sheltered spot south of the River Balder four species of Geometrid moths were found, a finely marked Latticed Heath, *Chiasmia clathrata*, being the most interesting. A colony of the Rivulet, *Perizoma affinitata*, was in a floriferous railway cutting in Romaldkirk where its food plant, Red Campion, was flowering. The Chimney Sweeper, *Odezia atrata*, was flying in pastures above Balderhead Dam. Bird Cherry in the area was draped with the webs of *Yponomeuta* species.

Flowering Plants and Ferns (Mrs M. Sykes)

Coeloglossum viride was found on an old railway bank, and a particularly large specimen was found on Fell Lane. Grasses included *Melica uniflora*, *Brachypodium sylvaticum*, *Festuca pratensis*, *F. arundinacea*, *Alopecurus pratensis*, *Poa pratensis* and *Arrhenatherum elatius*. One of the most interesting areas was at the lower part of Fell Lane, especially the old walls with the ferns *Asplenium ruta-muraria*, *Cystopteris fragilis* and *Polypodium vulgare*; *Blechnum spicant* and *Oreopteris limbosperma* were added at the adjoining Hole Beck Quarry. Other plants on the lane included *Geranium lucidum* and *Cirsium heterophyllum*. Hole Beck Quarry was particularly noteworthy for its sandstone type of vegetation as well as *Juniperus communis*. Also seen in the quarry were *Lotus uliginosus*, *Iris pseudacorus* and *Galium uliginosum*. *Achillea ptarmica* was found in a ditch on the north side of Fell Lane.

Plant Galls (F. B. Stubbs)

Of the twenty-two examples noted, the most unusual was that of the gall-midge *Dasyneura acrophila* on Ash. Each affected leaflet is thickened and folded upwards from the midrib until it resembles a full pea pod. A much less prominent gall on the midrib, attributed to *D. fraxini*, was also seen; this appears to be more common in Yorkshire.

Bryology (Miss J. Robertson)

Recording was only done around one of the reservoirs, below the Youth Hostel in Upper Baldersdale. This offered a range of mainly man-made alkaline habitats, with the occasional stream bringing down more acid water from the peats of Balderhead.

The extensive areas of exposed dam masonry provided sites for the common species: *Schistidium apocarpum* var. *apocarpum*, *Grimmia pulvinata*, *Polytrichum piliferum*, *P. juniperinum*, *Tortula muralis*, *Barbula unguiculata*, *B. convoluta*, *Ceratodon purpureus*, *Bryum capillare*, *B. caespiticium*, *B. pallens* and *Campylopus introflexus*. Some sheltered crevices of older limestone walls produced *Homalothecium sericeum* and *H. lutescens*, *Neckera complanata*, *Encalypta streptocarpa*, *Orthotrichum anomalum* and *Ctenidium molluscum*. *Pohlia wahlenbergii* and *Scapania undulata* occurred in one small tributary. On rocks in the River Balder and around the reservoir were *Schistidium alpicola* var. *alpicola*, *Rhynchostegium riparioides*, *Marchantia polymorpha*, *Hygrohypnum luridum*, *Racomitrium aciculare*, *Fissidens taxifolius*, *Fontinalis antipyretica* and golden brown patches of *Drepanocladus uncinatus*. *Pohlia nutans*, *Diplophyllum albicans* and *Cephalozia bicuspidata* were found on one or two wet, peaty banks. A small marsh at the upper end was dominated by *Amblystegium filicinum* and *Calliergon cordifolium*, with occasional *Sphagnum subnitens* and *S. recurvum* washed down from the more acid conditions in the fells above. *Eurhynchium swartzii*, *Thuidium tamariscinum*, *Rhytidiodelphus squarrosus*, *Calliergon cuspidatum*, *Climacium dendroides* and *Hylocomium splendens* were frequent in grassland round the margin. Woodland species grew sparingly in the few small copses, including *Isopterygium elegans*, *Dicranum majus*, *Plagiothecium undulatum*, and *Plagiomnium punctatum*. *Hypnum cupressiforme* var. *resupinatum*, *Lophocolea heterophylla* and *Dicranoweisia cirrata* were occasional epiphytes.

Mr T. Blockeel has very kindly acted as referee.

OGDEN AND SKIRDEN CLOUGHS (VC 63), 9 July (C. G. Shields)

This was a well attended meeting held in fine weather conditions. The areas around Ogden Reservoir were extensively planted just after the turn of the century with a variety of coniferous and non-coniferous trees, which thin out as one approaches the moorland. Damage caused to the woodland by sheep was sufficiently extensive to cause fears for its long-term ecological future, unless sensitive management including fencing is carried out.

Tea and the meeting for reports were held at the Bradshaw Parish Centre. Members of fifteen societies attended and the Chairman was Mr Ely. Mr Payne gave votes of thanks to Mr and Mrs C. Baxendale who organized refreshments, to the Divisional Secretary who made the arrangements and to the Yorkshire Water Authority who gave permission for the visit.

Ornithology (N. Carter)

The plantation area around Ogden Reservoir contained most of the expected species including Goldcrest, Coal Tit, Willow Warbler and numerous singing Chaffinches. Moving out of the woodland into Ogden Clough, Ring Ouzel was seen. The moorland between Ogden and Skirden Cloughs was traversed and the descent to the woodland was made down the latter. Golden Plover, Meadow Pipit and Skylark were seen and Twite heard by one observer. On the reservoir, it was pleasing to note thirty-six young Mallard divided into five broods including one of ten and one of nine young. The total number of species for the day was twenty-eight.

Mammals and Other Vertebrates (C. G. Shields)

Grey Squirrel was present in the woodland. There appeared to be some evidence, in the form of tracks and the manner in which bark had been chewed, to suggest the presence of deer in the upper part of the woodland. A Hare was seen. Among the reptiles and amphibians, three Common Lizards were seen near Great Rock and another in Skirden Clough, two small Smooth Newts were noted and there were several Common Frogs reported.

Entomology (W. A. Ely)

As the morning mist lifted and gave way to a warm, bright day, the insects became quite active. The most noticeable was the large St Mark's Fly, *Bibio pomonae*, with its black body and red legs, which was swarming in vast numbers all around the reservoir. A mating pair of the largest British empid fly, *Empis (Pachymeria) tessellata*, was found, and the female was feeding on a *B. pomonae* brought by the male. The large and impressive craneflies *Tipula fulvipennis* with smoky wings and *Pedicia rivosa* with a dark arrowhead mark on the wings were flying, as well as the tiny *Molophilus occultus*. A good range of mainly common hoverflies was present, including both species of the large black and yellow *Sericomyia* seen by Mr and Mrs Flint. Aquatic insects were much in evidence, of course. Dr Lloyd-Evans collected six species of stonefly from Ogden Clough — *Protonemura mayeri*, *Amphinemura sulcicollis*, *Nemoura cinerea*, *Nemurella picteti*, *Isoperla grammatica* and *Chloroperla torrentium*, and found a colony of the Common *Coenagrion* Damselfly at the top of Skirden Clough. Mr and Mrs Flint saw the Blue *Aeshna* Dragonfly catching Bordered-white Moths at the same place, and at the lower end of this clough were the Large Red, Common Blue and Common *Ischnura* Damselflies. Apart from the insects in the wooded cloughs and along the water's edge, there were also good numbers on the south-east facing dam wall, sunning themselves and feeding on the flowers.

Lepidoptera (Mrs J. Payne)

The seven species of butterfly seen during the day were the three Whites, *Pieris brassicae*, *P. napi* and *P. rapae*; Small Heath, *Coenonympha pamphilus*; Small Copper, *Lycaena phlaeas*; Small Tortoiseshell, *Aglais urticae*, and Red Admiral, *Vanessa atalanta*. Among the moths, Emperor, *Saturnia pavonia*, caterpillars were found on the moor and a single Grey Mountain Carpet, *Entephria caesiata*, was netted near the top of Ogden Clough. The most pleasing sight was the Wood Tiger, *Parasemia plantaginis*, flying in the sunshine above

Skirden Clough, a total of six being reported during the afternoon. A caterpillar from the genus *Plusia* collected was exceptionally long and stout for any expected species. It prepared to pupate in a net-like cocoon in a pill box. The larva took up a U-shape and turned blackish in colour. Fifteen days after collection, on 24 July, an estimated one thousand Chalcids emerged from the larva. The caterpillar had not in fact been stung this many times as might be believed, as the eggs of Chalcids have the ability to multiply after laying.

Aculeate Bees and Wasps (M. Archer)

Collecting was restricted to the disturbed ground in the vicinity of the car park at Rock Hollow, where several species were nesting, and to a derelict garden nearby. All species found were common with regard to their Yorkshire distribution. Species found were *Priocnemis parvula*, *Nomada ruficornis*, *N. panzer*, *Lasioglossum calceatum*, *L. rufitarse*, *Crossocerus tarsatus* and *C. elongatulus*.

Flowering Plants and Ferns (D. R. Grant)

In the morning the botanists explored Ogden Clough. This is a deep, narrow valley running from the heather moorland down to the reservoir. In the Millstone Grit series of rocks there are bands of calcareous shales which appear in the middle portion of the clough. Their presence is easily identified by the large colonies of the moss *Cratoneuron commutatum* which grows in the flushes on the sides of the valley. The sedge *Carex flacca* also confirms the presence of lime. These flushes had some large colonies of *Carex laevigata* and *Crepis paludosa*. It was pleasing to confirm an old record of *Rubus saxatilis* in the largest flush on the south side of the valley. Other plants of note in the area were *Oreopteris limbosperma*, *Dryopteris affinis* and *Carex demissa*. Further up the valley, another old record for *Phegopteris connectilis* was confirmed. On the drier parts of the valley sides, the sedges *Carex pilulifera* and *C. binervis* were noted. *Pinguicula vulgaris* used to occur in this valley, but the colony was washed away by storm water and no plants were seen on this occasion.

MOUGHTON (VC 64), 16 July (Mrs J. Payne)

The 688th meeting was well attended with more than sixty naturalists in the field. The numbers were boosted by a coach party from Halifax, who were transported from Austwick village to Crummack Farm by car. From there Dr W. A. Sledge and Mr D. Grant led parties of botanists to explore the mosses and extensive limestone pavements of the Moughton plateau.

Over twenty affiliated societies were represented, and there were visitors from Cumbria and Lancashire. Fifty-seven people attended the meeting held in the Reading Room at Austwick, where the Lord of the Manor and his Lady, Dr and Mrs Farrar, and Mr and Mrs Murphit, representing the Grazing Rights Holders on Moughton, joined the party.

The meeting was well behind schedule owing to the naturalists' enthusiasm to explore the plateau fully in favourable conditions. Dr L. Lloyd-Evans took the chair and the roll was called by the Divisional Secretary. Reports followed and then Mr Roy Crossley proposed a vote of thanks to the Divisional Secretary and Mr K. G. Payne, the Common Rights Holders, Mr and Mrs Joe Shevelan, Mr Moore of Crummack Farm, Dr W. A. Sledge and other leaders and Miss H. LeFevre for help and advice.

The 10 km square worked was SD 77; Austwick and Wharfe are in SD 76 and the Ribblesdale side of Moughton is in SD 87.

Ornithology (M. L. Denton)

During July in an area such as Moughton only the common breeding birds can be expected. The ornithologists in the party therefore recorded nothing of great note. The breeding birds present included Curlew, Lapwing, Common Sandpiper, Kestrel, Ring Ouzel, Wheatear and Meadow Pipit, the last named species being particularly abundant. Small parties of Twite were encountered throughout the day and these delightful birds may well have been breeding. A total of twenty-eight species was recorded.

Mammals and Other Vertebrates (Mrs J. Payne)

Signs of Rabbit, Hare and Mole were noted. No frogs or tadpoles were seen in the mosses. Two Palmate Newts were seen and also a Common Lizard.

Entomology (W. A. Ely)

The heavily grazed grassland of Crummackdale provided few good insect habitats. The Bracken areas allow grasses and flowering plants to develop, protected from the sheep, and these held common species of grass feeders as well as specialist Bracken feeders such as the common sawflies *Stromboceros delicatulus* and *Strongylogaster lineata*. The banks of the stream had plenty of common ground beetles, including *Pterostichum vernalis* and *Synuchus nivalis*. Mr Crossley ventured onto Thieves Moss and found several interesting flies, including the small soldier fly *Oxycera pygmaea* (which is recorded from a handful of Yorkshire sites), the snail-killing fly *Dictya umbrarum* and two 'dolllies' (Dolichopodids) — *Campsicnemus alpinus*, which is uncommon, and *C. compeditus*, a national rarity which is new to Yorkshire. At the end of the day the small, marshy stream near Crummack Farm yielded a good selection of small insects, including the sawfly *Athalia lugens* and the small yellow cranefly *Molophilus bifidus*.

Lepidoptera (Mrs J. Payne)

The only butterfly which was common in Crummackdale and on the Moughton plateau was the Small Heath, *Coenonympha pamphilus*, though Common Blue, *Polyommatus icarus*; Green-veined White, *Pieris napi*, and Small Tortoiseshell, *Aglais urticae*, larvae were present.

Odd specimens of Muslin Footman, *Nudaria mundana*; Silver-ground Carpet, *Xanthorhoe montanata*; Purple Bar, *Lyncometra ocellata*, and Magpie, *Abraxas grossulariata* were observed. The Autumn Green Carpet, *Chloroclysta miata*, was collected as a larva and bred out successfully. A grey 'miero' was set up many times and was named as *Eudonea mercurella* by H. E. Beaumont. It is said to feed on thick tufts of moss on rocks and tree trunks. Dr S. L. Sutton found Juniper Pug, *Eupithecia sobrinata*, common on the fell top. This is very pleasing in that it has not been recorded previously, being a new VC 64 record for the pug, on native Juniper.

Mollusca (A. Norris)

The long period of very hot, dry weather made collecting on the open grassland and scree very difficult. However, we were able to locate twenty-five species of mollusca, even though a number of these were represented by single specimens only. In particular, it was very difficult to find such species as *Clausilia dubia* and *Abida secale*, two species which normally occur in large numbers on the open cliff faces in this area. Perhaps the most interesting finds of the day were a single specimen of *Acicula fusca*, a species only rarely noted in the county, and specimens of *Vitrea subrimata*. This latter species was first recorded in Britain by Mrs M. Fagan, who found it under scree in Oxenber Wood, Austwick, in May, 1966 (see Kerney, M. P. and Fagan, M. 1969. *Vitrea diaphana* (Studer) in Britain. *J. Conch.* 27: 17-24). Since the publication of this paper it has been shown that its correct name is *Vitrea subrimata*. It has been found at a number of localities on the mountain limestone, where it is considered to be a glacial relict species.

Flowering Plants and Ferns (W. A. Sladge)

From Crummack Farm the main party walked to Thieves Moss. This considerable peaty bog has formed in a depression which is surrounded on all sides by rocky limestone slopes. The contrasting floras of the closely adjacent acid bog and dry limestone afford interesting comparisons. *Drosera rotundifolia* was seen with open flowers thanks to the bright light and windless conditions, but *Narthecium ossifragum* was the only other conspicuous flower amongst the tussocks of *Nardus*, *Molinia*, *Scirpus cespitosus* and *Eriophorum angustifolium*. Along the runnels draining from the limestone into the Moss *Schoenus nigricans* was notably plentiful. Calcicolous species observed in damp ground on the fringes of the Moss included

Primula farinosa, *Pinguicula vulgaris*, *Sagina nodosa*, *Selaginella selaginoides*, the sedges *Carex dioica*, *C. hostiana*, *C. lepidocarpa* and *Eleocharis quinqueflora*. The bare rocks on the southern margin of the Moss are one of the stations for *Arenaria norvegica* subsp. *anglica*. This was past flowering on account of the long dry spell of weather, but a second generation of plants will develop later in the year from the seed now being shed.

Leaving Thieves Moss, the party next crossed over Moughton Fell to Juniper Valley above Horton-in-Ribblesdale. Much of the walk was over limestone scree and pavements, and here Mr Roberts pointed out *Viola rupestris* and the distinction between it and the small form of *V. riviniana*. Ferns were abundant in the crevices of the limestone rocks, and a dozen different species were noted. These included *Asplenium trichomanes*, *A. viride*, *Cystopteris fragilis*, *Gymnocarpium robertianum*, *Dryopteris villarii*, *Polystichum aculeatum* and *P. lonchitis*. In two widely separated areas *Listera cordata* was seen growing under Juniper bushes. It was first observed in one of these stations by J. M. Brown at a YNU excursion in 1930, and I have seen it here intermittently ever since. It was gratifying to find the Holly Fern also, still in fair quantity and in good condition in the place where it was first shown to me by C. A. Cheetham in 1929.

Mr Grant's party walked eastwards from Crummack Farm to Austwick Beck Head and investigated the flushes and scars bordering Moughton before ascending onto the fell top. Many of the species enumerated above were seen; others not seen by the main party included *Geranium sanguineum*, *Veronica anagallis-aquatica*, *Potamogeton polygonifolius*, *Polygonatum odoratum* and *Ophioglossum vulgatum*. The best find, however, was that of two colonies of *Eleocharis austriaca*, which had not previously been recorded from the Austwick district. Twelve species of *Carex* were listed by the two parties, but all were typical members of the communities in which they occurred.

Bryology (T. L. Blockcl)

The most conspicuous bryophytes on Thieves Moss were *Sphagnum papillosum*, *S. subnitens* and *Leucobryum glaucum*. Among these and on moist peat were *Polytrichum alpestre*, *Odontoschisma sphagni* and *Cephalozia connivens*. Under more calcareous conditions on the edge of the Moss and on flushed limestone were *Gymnostomum aeruginosum*, *Breutelia chrysocoma*, *Cratoneuron commutatum* var. *falcatum* and *Scorpidium scorpioides*. Only a short time was spent on the top of Moughton. The dry limestone was not rich in bryophytes, only *Tortella tortuosa* and *Racomitrium lanuginosum* being plentiful. The flora was somewhat more luxuriant under the shelter of Junipers, with such species as *Rhytidadelphus triquetrus*. On the descent from Moughton there was a marked change in the flora on the pre-carboniferous rocks at Austwick Beck Head: *Andreaea crassinervia* and *Leptodontium flexifolium* were noted here.

A short visit was made to Twistleton Glen, Ingleton, one of the premier bryological sites in Yorkshire. In addition to some of the known specialities, *Coscinodon cribrosus* was seen fruiting in its recently discovered station (the second in Yorkshire), and the small moss *Fissidens celticus* was added to the county flora. This is a species of strongly south-western distribution, but Ingleton is of course celebrated for its concentration of Atlantic bryophytes. The *Fissidens* was on the shaded banks of the stream with *Jungermannia gracillima*.

BOOK REVIEWS

Our Arid Environment edited by Keith Davey. Pp. 144, with colour photographs and drawings. **Our Wildlife in Peril** illustrated by Dorothy Dunphy. Pp. 175, with black and white drawings. Lansdowne-Rigby. 1983. £12.95 each.

The pronoun 'our' in the titles of these books refers to the anonymous Australian compilers of the texts whose object is to interest their fellow-countrymen in the natural history of Australia. Seventy per cent of the continent is arid, but since this vast area is a natural

desert, animals of all kinds have for millennia been evolving adaptations to the harsh conditions. They range from the crustacea that appear in ephemeral pools after scanty rain and the insects and other arthropods, of which there are very many, to the unique mammals and the diverse birds of the country. There are even some amphibians that have become adapted to prolonged drought, and lizards and snakes as well. Many of them are described in the *Environment* book, and illustrated by means of excellent colour photographs and line drawings. The climate, landforms and vegetation are outlined too, and the various adaptations of the animals are emphasized throughout. Since the book is a compilation from very varied sources the treatment tends to differ from section to section, technical terms being avoided in some parts and introduced without explanation in others. Nevertheless it is a fascinating story, full of interesting facts and quite well told. Although the Australian desert is not man-made, the ecosystems it supports are very fragile and can readily be destroyed by human interference. People want to farm, to ranch, to go on shooting expeditions, to search for minerals and to divert scanty water supplies, and have introduced feral animals such as foxes, cats, rabbits, goats, horses, donkeys and camels.

The pressing need for conservation is stressed in the *Environment* book, and of course is the whole theme of *Wildlife in Peril*. The latter book has a pleasing unity contributed to it by the excellent illustrations. The black and white drawings printed on a tinted background and the distribution maps complement the descriptions very well. Inevitably most of the entries relate to mammals, birds and reptiles, but other groups such as fishes and various invertebrates have not been forgotten. The two books are beautifully produced at a reasonable price, and should bring an interesting and important subject to the attention of a wide audience.

FHB

Field Guide to the Water Life of Britain (336 pp.), **Field Guide to the Animals of Britain** (320 pp.) and **Field Guide to the Butterflies and Other Insects of Britain** (352 pp.). Reader's Digest Association. 1984. Prices £8.25, £8.25 and £8.50 respectively.

With these new titles, Reader's Digest have added three most welcome and informative guides to their Nature Lover's Library. For the non-specialist the identification key is helpful and easy to use, leading the reader to the relevant full page recognition profiles, all delightfully illustrated, showing habitat, life cycle, distinguishing features, distribution, etc. Particularly welcome is the inclusion of a detailed section on caterpillars — missing from some other butterfly field guides — and there are helpful look-alike charts for recognition of similar species such as deer.

Much attention has been paid to conservation and protection of our wildlife, with suggestions as to how to avoid putting threatened species under pressure, and how to encourage certain others to settle and breed in our gardens where appropriate. Further background information is supplied in special features describing and illustrating the wildlife associated with each main type of inland or coastal habitat, plus notes on field craft, track recognition etc. Armed with these guides the amateur naturalist should have no difficulty in the field — perhaps the weight of the volumes would be a problem? As armchair reading they provide a fascinating, informative and beautifully produced trio of titles to add to the three published in 1981.

DAC

Guide to the Grasses, Sedges, Rushes and Ferns of Britain and Northern Europe by Richard Fitter, Alistair Fitter and Ann Farrer. Pp. 256, well illustrated. Collins. 1984. £5.95.

This is a companion guide to the *Wild Flowers of Britain and Northern Europe* (Blamey, Fitter & Fitter, 1974) and covers the same area. An initial section of simple descriptions of major plant groups with emphasis on those characters used in identification, such as ligules and fruits, is followed by a description of the keys and instructions on how to use them. Traditional keys require considerable knowledge of botanical structures and terminology; this book is intended for the 'uninitiated' general reader and a new approach has been tried — a single access key, in which a restricted group of characters only is used. A specimen

incomplete in respect of a particular character can still be identified from the rest of the key. Separate keys are provided for each of the four plant groups of the title, also a starter key to assign the specimen to one of these, or to horsetails or clubmosses which are also included. The characters used in the keys are simple and mostly fairly easily determined. I found that the sedge, rush and fern keys worked reasonably well, but I had difficulty in keying out grasses and found that the grass key could be misleading and frustrating. For example, growth form is used as the second determinant with creeping, rhizomatous etc./clearly or densely tufted being alternatives — some species e.g. *Sesleria albicans* are both rhizomatous and clearly tufted. Ligule characters can also be difficult: ragged ligules may be an artifact of age or handling as well as a genuine state.

The keys are followed by the main section of the book which consists of concise descriptions and paintings of the individual species, accompanied by subsidiary sketches of critical features such as fruits and spore cases. While the paintings give a real 'feel' for the species, structural details (particularly of the grasses and some of the ferns) are not always as distinct as they might be in a drawing.

The final section comprises a set of useful distribution maps. These are, however, inadequate for Iceland and the Faroe Islands (which are specifically included in the area covered by the guide): at least twenty species which occur in Iceland (about 5 per cent of the total flowering plants there) are not indicated on the maps; a similar number of Faroese species are omitted.

In spite of my reservations I am sure that this book, with its attractive coloured illustrations and its reasonable price, will be of interest to naturalists, particularly those who have previously regarded these plant groups as 'difficult'.

JMD

The Well-Chosen Garden by Christopher Lloyd. Pp. 176, including 109 full colour illustrations and 2 maps. Elm Tree Books. 1984. £12.50.

A new book by this idiosyncratic, dogmatic, but always enjoyable author is an event worth celebrating; his latest title is stimulating, challenging, full of original ideas and beautifully illustrated. Well worth spending that book token on.

The Book of Old Roses by Trevor Griffiths. Pp. 168, fully illustrated with colour photographs. Michael Joseph/Mermaid Books. 1984. £7.95, paperback.

A superbly illustrated and informative book, covering nearly 600 'old roses', grouped in their various families. A slight drawback is the text's bias towards growth performance in New Zealand, which in some cases may not accurately reflect British experience. Highly recommended nevertheless as the photographs alone are a delight, and the book is excellent value for money.

The Complete Handbook of Garden Plants by Michael Wright, assisted by Sue Minter and Brian Carter. Pp. 544, including 260 in colour. Michael Joseph/Rainbird. 1984. £9.95.

A useful book, since it manages to cover an amazing number of plants (over 9000) in a handy format, but the information is necessarily very compressed and would need supplementing from other sources. The plentiful illustrations, depicting over 2500 plants, are supplied by a team of over twenty artists and vary considerably in quality.

History of the British Flora by Sir Harry Godwin. Pp. x + 541 including 178 figures and 48 tables, plus 28 pages of plates. Cambridge University Press. 2nd edition. 1984. £18.00, paperback.

A welcome paperback reprint of this classic work, fully reviewed in the *Naturalist* 100:97-99 (1975). The reduced format is generally successful but there has been some loss of definition of a number of line drawings, particularly distribution maps. Although still pricey, it will now be available to a wider audience, including, one hopes, students.

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